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Fig. 24. *a*, The rectum has been excised and an exact watercolor picture made of the external surface of the gross specimen unopened. *b*, The rectum has been laid open and an exact watercolor drawing made of the cancer. This is a typical growth and is the most frequent location of cancer of the rectum in the curable stage.

Principles of the Operation for Carcinoma of the Rectum.—Robert C. Coffey.

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PRINCIPLES OF THE OPERATION FOR CARCINOMA OF THE RECTUM[1]

BY ROBERT C. COFFEY, M.D., F.A.C.S., PORTLAND, OREGON

COMPLETENESS is the most important desideratum connected with a surgical operation for cancer. Considered biologically, from the standpoint of the mere eradication of the cancer itself, completeness is the ideal to be sought. Considered broadly in the interest of the patient, this ideal must sometimes be modified. For instance, the Wertheim operation for cancer of the uterus is ideal from the standpoint of removing the cancer, but it is the opinion of a great many very competent surgeons that the increased mortality following this radical or ideal procedure more than outweighs the increased number of permanent cures. In other words, it is the opinion of most surgeons that a modified operation is advisable as a general rule, in that the modified operation in a thousand given cases of carcinoma of the uterus will probably add a greater total of comfortable days of life than would be observed in a thousand patients treated by the more ideal method of Wertheim. The complete block dissection for cancer of the neck, including the removal of all the vital tissues, such as the carotid artery, jugular vein, and even the pneumogastric nerve, is ideal from the standpoint of removal of the cancer but we are always called upon to decide whether it is ideal from the standpoint of the patient. The same is true of cancer of the lower jaw or base of the tongue, for which a surgeon, by a series of daring surgical maneuvers, removes these organs.

Some surgeons in operating for cancer of the uterus use the cautery and attack the most inoperable cancers, well knowing that more than likely both the rectum and bladder will be opened in the procedure if the operation is to be thorough. They seemingly disregard the other organs on the ground—as I once heard a surgeon say: "We are dealing with cancer." We must remember also that we are dealing with a patient—a human being.

Cancer of the rectum has in the past been placed in this same category of borderline operability. The old Kraske one-stage operation, giving a mortality of 25 per cent or more with no control and no means of taking care of the fæcal contents, was a most formidable affair. Who would want to be operated upon under such circumstances? Quite a few no doubt, but many of those choosing the operation would doubtless be quietly hoping to belong to that more fortunate 25 per cent or more of fatalities. It is this most terrible and mutilating of operations that has caused surgeons from time to time to try more conservative procedures by which the sphincter muscle could be preserved. Unfortunately the growth returns, the patient has very poor control at best; and nearly all surgeons have abandoned the effort to preserve the sphincter

[1] Read before the Southern Surgical Association, December 11, 1923.

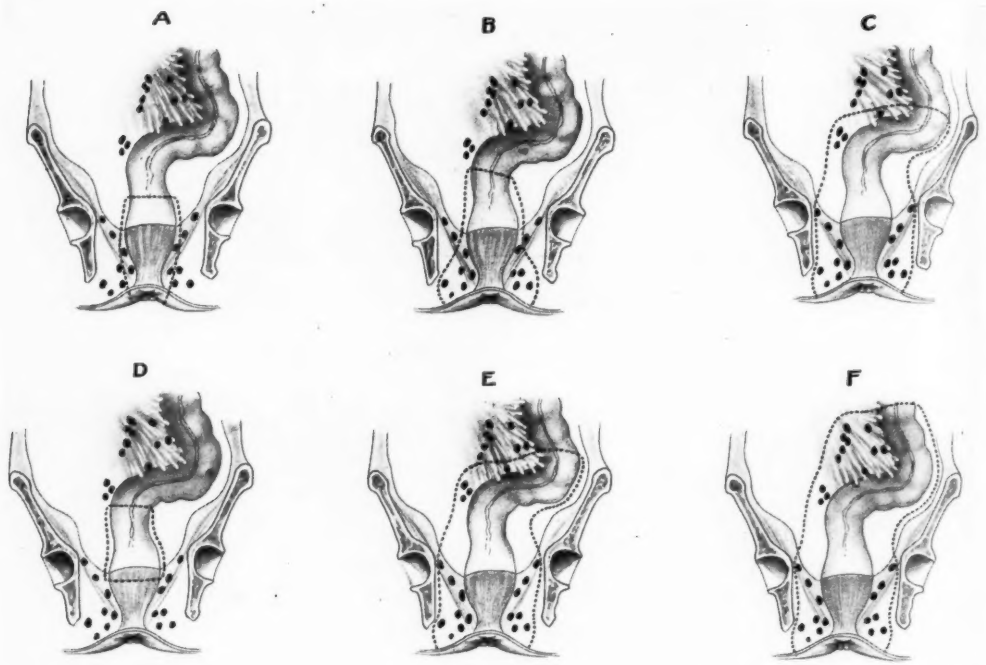

Fig. 1. *a*, Diagram showing the restricted nature of Kraske's operation. The rectum is merely dissected out as a tube containing a cancer, and the vulnerable tissues of the upward, lateral, and downward zones of spread are left. (Miles.)

b, Diagram showing the first step in the evolution of the radical operation. The peri-anal skin and the ischiorectal fat were widely removed as these tissues have been found vulnerable to recurrence. (Miles.)

c, Diagram showing the extension of the operative field as a further step in the evolution of the radical operation. In addition to the peri-anal skin and the ischiorectal fat, all of the levatores ani muscles and the lower part of the pelvic mesocolon were included as these tissues were found to be highly vulnerable. (Miles.)

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Contrary to the established belief, there are few parts of the body so favorably situated as the rectum for complete devascularization and removal of all the involved tissues in case of cancerous invasion. Most of the blood supply for the ampulla of the rectum and the rectosigmoid, as well as that of the connective tissue and fat found in the hollow of the sacrum, comes through one vessel—the superior hæmorrhoidal artery. Most of the return

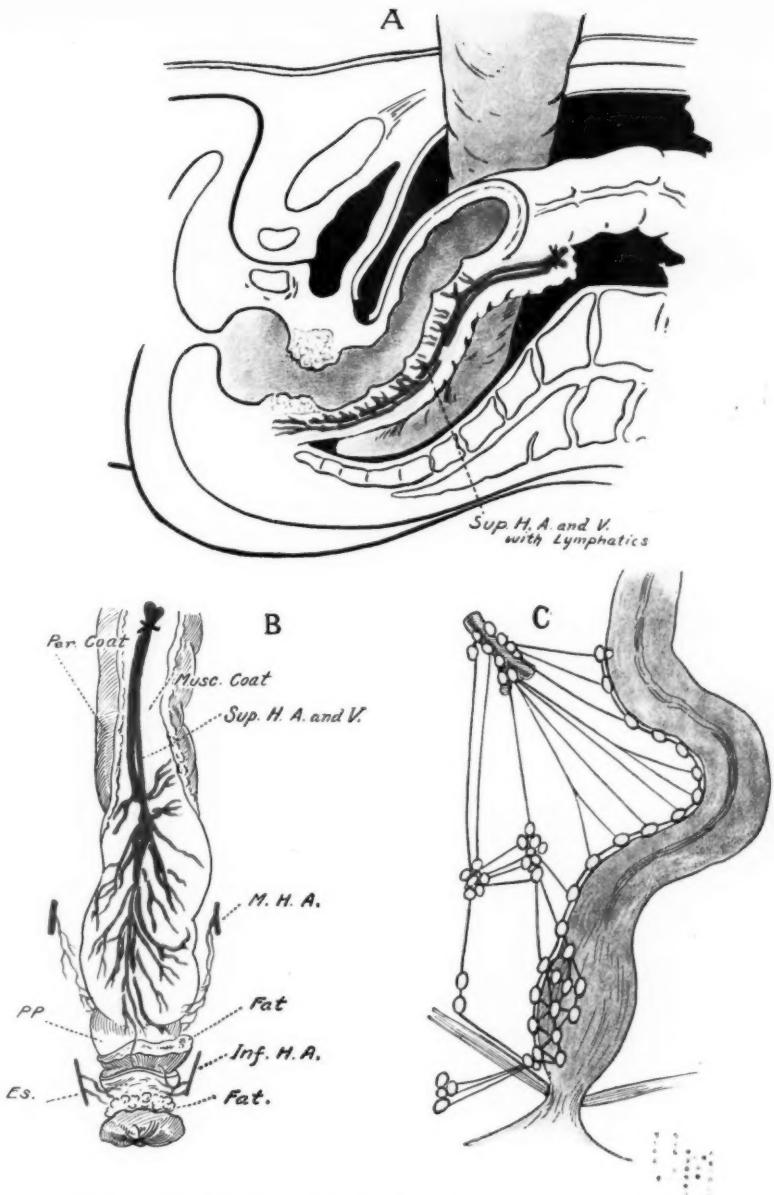

Fig. 2. *a*, Complete devascularization from above is possible by ligation of the superior hæmorrhoidal vessels at the promontory of the sacrum. Note arteries, veins and lymphatics. *b*, Direct view of superior hæmorrhoidal vessels and lymphatics which occupy the retrorectal space. The ligation of these vessels devascularize the ampulla of the rectum and rectosigmoid. *c*, Elaboration of Miles' picture showing the lymphatics of the rectum.

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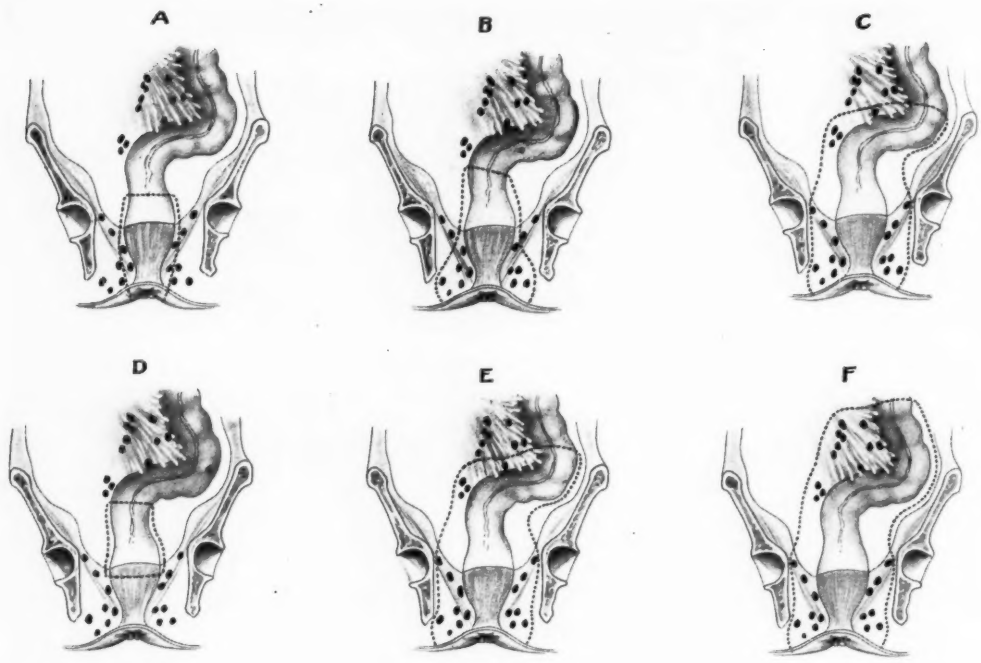

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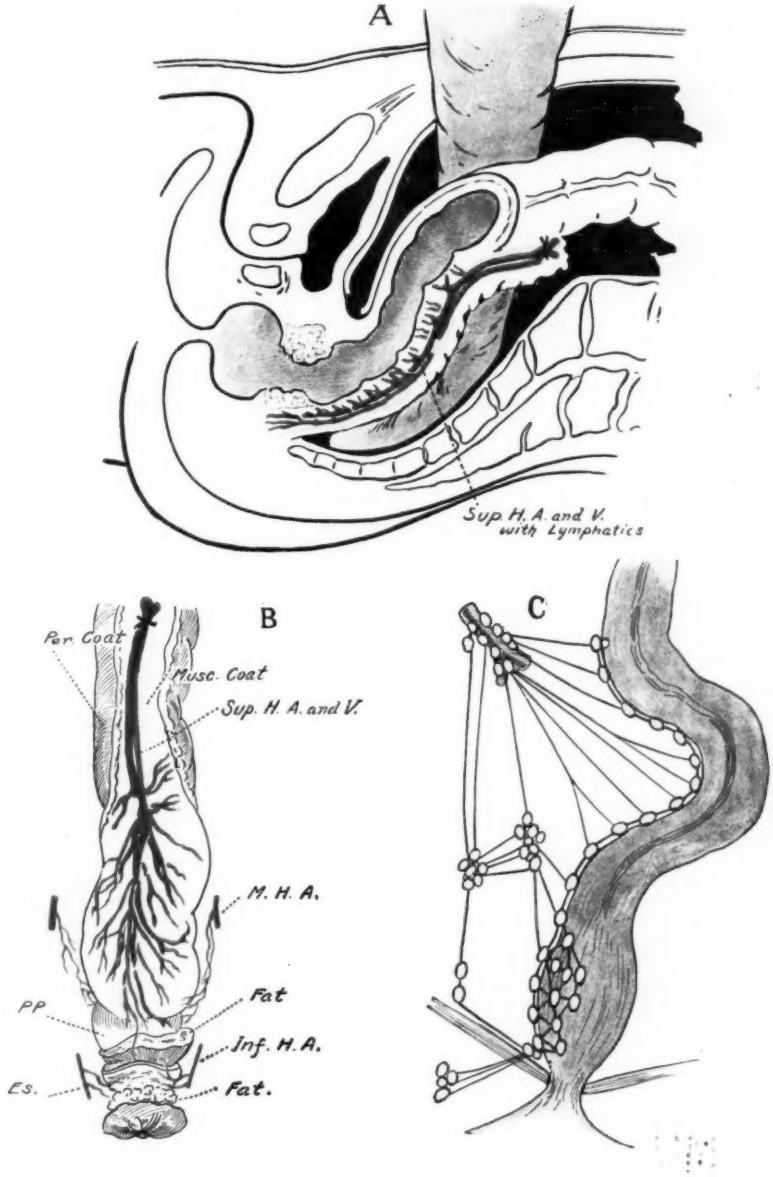

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circulation goes back through corresponding veins and these vessels are accompanied by the lymphatics, which together serve as almost the sole avenue for the spread of the disease upward. These vessels may all be included in a single ligature placed opposite or just below their crossing of the promontory of the sacrum in the mesosigmoid. It will be seen by the composite colored plate (Fig. 2) that this ligature at once severs the blood supply and the venous and lymphatic return circulation, thereby removing the danger of hæmorrhage as well as upward metastasis during the further progress of the operation.

The article of Mr. W. E. Miles, which appeared in the *British Medical Journal*[1], and was abstracted in the INTERNATIONAL ABSTRACT OF SURGERY[2], gives a very lucid description of the lymphatic circulation and also a very clear description of the method of the spread of cancer of the rectum as follows:

"Operation undertaken for cure of cancer must be based on the pathological findings and the field of operation must embrace all tissues apt to become invaded. The question of operation therefore necessitates a knowledge of the method in which cancer of the rectum spreads and the paths it takes. The early stage of adenocarcinoma of the rectum is confined to the mucous membrane and submucous tissue. It is sessile and readily movable upon the subjacent muscular coat, gradually increases in size and spreads in three distinct ways:

"1. By direct extension through continuity of tissue.

"2. Through the venous system.

"3. By means of the lymphatic system.

"*Spread of growth by direct extension through continuity of tissue.* Although the tumor is freely movable at first, it soon becomes adherent. Extension takes place in all directions, but more in the transverse than in the longitudinal axis of the bowel. Adherence begins at the center or the oldest part of the tumor, but surface extension may progress more rapidly in one direction than another, thus fixing the indurated portion nearer one lateral margin than the other. It is difficult to determine how long a growth has been the present. From observations of tumors in ampulla of the rectum, however, it may be inferred that by the time three-quarters of the circumference of the bowel is involved the growth is more than 1 year old. While the growth is extending around the circumference of the bowel, infiltration of the muscular coat is taking place. This penetration continues until it is arrested for a time by the lymph sinus between the outer surface of the bowel and the surrounding fatty tissue. The growth finally extends across this space and involves the perirectal fatty tissue and the fascia propria of the rectum. Penetrated fixation to the sacrum, prostate, bladder, uterus, or vagina is impossible until the fascia propria has been involved. This would not occur, therefore, until a year after the earliest symptoms indicating the presence of the growth. Direct extension of carcinoma of the rectum is comparatively slow, and invasion of the surrounding tissues does not take place until the greater part of the circumference of the bowel has become involved.

"*Spread of growth by the venous system.* Microscopic specimens afford evidence of direct invasion of venous radicals. It is, therefore, easy to understand how even in an early stage cancer cells may be detached and carried to a great distance from the primary growth, especially to the liver. Fortunately, this mode of spread is rare, and definite liver metastases are generally a late manifestation.

"*Spread of growth by the lymphatic system.* The most important route by which cancer cells are disseminated is through the lymphatic channels. In the rectum there are two distinct sets of lymphatic channels by means of which such spread takes place: i.e. the intramural and the extramural lymphatic systems. Dissemination in the intramural system is of very limited extent. The general scheme of the extramural lymphatic channels is represented in Figure 2, *c*. The various tissues traversed by these vessels are vulnerable to metastatic deposits. Corresponding to the three lymphatic areas there are three zones of spread: (1) the zone of downward spread, which includes the peri-anal skin, the ischiorectal fat, and the external sphincter muscle;

[1] 1920, ii, page 730.
[2] 1921, xxxii, 280.

Fig. 3. The sigmoid is mobilized by cutting the peritoneum on each side of its mesentery. Dotted line indicates incision of peritoneum of cul-de-sac around rectum and between bladder and rectum with long handle angle scissors.

(2) the zone of lateral spread, which embraces the levatores ani muscles, the retrorectal lymph glands, the internal iliac glands, the base of the bladder, and the vesiculæ seminales, and, in the female, the posterior wall of the vagina, the cervix uteri, and the base of the broad ligament with Poirier's gland; and (3) the zone of upward spread, which includes the pelvic peritoneum, the pelvic mesocolon in its entirety, the paracolic lymph glands, and the group of lymph glands at the bifurcation of the left common iliac artery."

The author concludes that early growth in cancer of the rectum may metastasize widely into these zones and cannot be detected by ordinary rectal examination. He says: "The peritoneum, especially that portion which lies on either side of the parietal attachment of the pelvic mesocolon, is very often the seat of growth. Deposits, no doubt, begin in the subperitoneal lymphatic plexus, and the small intestine coming into contact with an exposed placque, may become infected and cause widespread dissemination. The pelvic mesocolon is also very frequently the seat of metastatic deposits even in early cases. Lastly, the paracolic glands may become the seat of metastasis. Cancer cells do not spread according to the anatomical lymphatic distribution but according to laws of their own. Thus metastasis may occur in any or all of these zones irrespective of the position of the primary growth.

"Cancer of the rectum, regardless of its position, is apt to spread to the tissues of the three zones described. The most vulnerable of these are the ischiorectal fat, the levatores ani muscles, the retrorectal glands, and the pelvic mesocolon. Therefore, these tissues must be freely removed in an operation for cancer of the rectum."

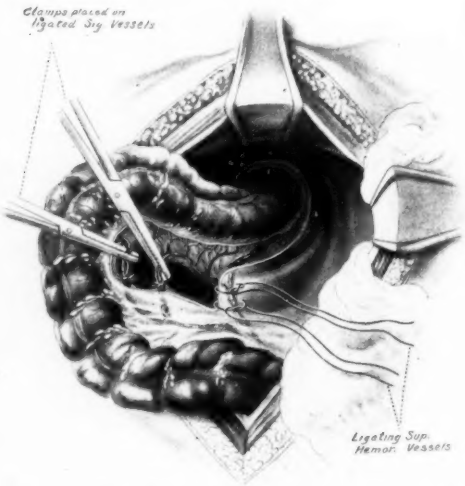

Fig. 4. Two ligatures placed around the superior hæmorrhoidal vessels about 1 inch apart. The sigmoid arteries tied on one side and clamped on the other.

Figure 1 was taken from Miles' article and has been redrawn for the purpose of making more graphic the important lines. These figures show the relative thoroughness of the various operations which have been done in the past and Figure 1, *f*, represents the ideals of thoroughness to be sought after. This plate with Figure 2, which represents a composite picture of the important vessels to be noted in the operation for cancer of the rectum, together with the succeed-

ing pictures in this article, will give the reader a graphic view of the enormity of the operation for removal of cancer of the rectum.

Up to this point, we are prepared to say that in the first place, it is possible to provide an artificial anus that permits a relatively comfortable continuation of life, thus disposing of one of the drawbacks of the original Kraske operation. Second, its anatomical relations to other organs, and the arrangement of its vascular and lymphatic supply makes it possible to remove a cancer of the rectum more completely and radically than almost any other cancer connected with the body. To undergo this radical operation is a tremendous strain on the vitality of the patient, for, as will be seen by these first two illustrations taken with those describing the technique for performing it, the abdomen must be opened and explored, the lower pelvic colon must be removed with all the fat of its mesentery and the fat found back of the rectum in the hollow of the sacrum and in the ischiorectal space, all the levator and sphincter ani muscles and in front all the connective tissue up to the vagina in the female, and the bladder, prostate, and urethra in the male. There is much sewing to be done in this operation which requires a great deal of time. In short, the radical operation for cancer of the rectum is one of the largest in surgery.

Fig. 5. The fingers of the left hand, insinuated between the severed ends of the superior hæmorrhoidal vessels and between the cut peritoneal edges of the mesosigmoid, are lifting the fat from the hollow of the sacrum down to the coccyx.

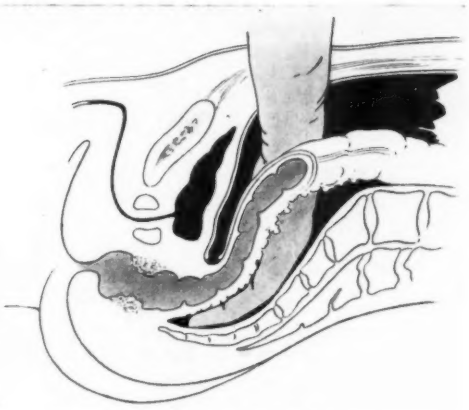

Fig. 6. Sectional view of Fig. 5.

While it is true that some prefer the one-stage operation, I am very sure that the average operator, equally skilled in doing both the one-stage and two-stage operation, will obtain better results with the two-stage. While some individual patients have reparative material sufficient to make repair and at the same time keep up defense against infection throughout all the area involved in this operation, a large percentage of patients cannot put up the necessary defense all at one time. In attempting to do several operations in different parts of the body at the same operative session, I have frequently noticed a break-down of the defensive even to a point at which a clean abdominal incision would fail to unite. Therefore, it seems conservative and wise in very large operations to give nature all of her defensive forces with which to produce an unbroken physiological mechanism before the entire burden of repair is thrown upon her. And after the principal avenues of extension have been severed or devitalized, we can then safely give the natural forces time to make the necessary repair for a complete and physiological mechanism before the final stage of the operation is to be done. In the early part of my work I attempted to do the second operation too soon, say within 4 or 5 days after the first,

Fig. 7. Clamping and cutting the sigmoid after the vessels have been ligated. Note that one of the clamps passes through the stab wound in the rectus muscle.

Fig. 8. Proximal sigmoid has been fastened to layers of abdominal wall and its end held closed with a clamp. Tube is passed up to end of distal sigmoid, where it is fastened by a strong double suture passed through the intestine and eyes of tube and tied. By pulling on the tube, the sigmoid is inverted and drawn out through the anus.

and was often disappointed by the breaking down of an uninfected abdominal incision or the giving way of the peritoneal surfaces as sutured. I therefore venture the dogmatic assumption that in order to get the best results, it is necessary to do this operation in two stages, for I contend that the extent of the operative procedures cannot be greatly abridged if we are to obtain the best permanent results. It is further interesting to note that no more radical operation can possibly be done if we are to have proper regard for the interest of our patient, for in line with the statement at the beginning of the article, any growth which involves other vital organs in the pelvis, such as the bladder, ureters, or the sacrum, should be considered inoperable when taken from the standpoint of the patient and should be treated by palliative measures.

Up to this point, I think we may reasonably assume first, that we can comfortably dispense with the organ involved. Second, the involved organ is so situated, constructed, supplied, and drained that it may be removed without seriously involving other organs. Third, it can more safely be thus radically removed by utilizing the two-stage principle.

We are now confronted with the question: What two-stage method will assure a complete operation with the least drain on the vital forces of the patient with a resultant minimum mortality? It is not the purpose of this paper to discuss the relative value of the work of the great men who have led the way and shown us the possibilities in this field of surgery except in so far as it immediately concerns the principles under discussion. Suffice it to say that in all my early work I faithfully attempted to follow the work of Drs. W. J. and C. H. Mayo, whose work constituted largely a co-ordination and clinicalization of the best methods of European and American surgeons with their own original work and I think it will be generally conceded that certainly no better work has been done than that at Rochester. It was only about 10 years ago that I began to change

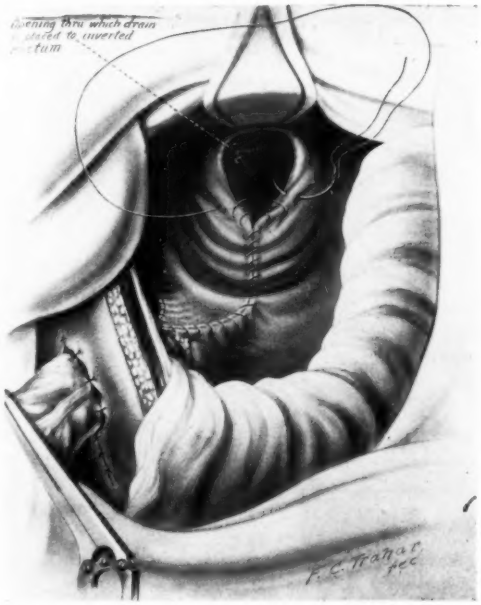

Fig. 9. After the space between the sigmoid and the left lateral parietal peritoneum has been closed by suture, a continuous catgut is run along the mesosigmoid covering the raw fat edges with peritoneum down to the narrow portion of the cul-de-sac, where drain is inserted.

my methods from the established methods used there. In the meantime, a number of other men, such as Lockhart-Mummery, Miles, Jones of Boston, and others were also varying the established technique. I shall not discuss the relative merits of these various procedures but rather the principles involved in the whole subject as indicated in the title.

As has been said, the lowest mortality with the old one-stage Kraske operation was, as far as I know, achieved by the Mayos and was about 25 per cent. The first great drop in the mortality rate was when the two-stage principle was adopted. In this operation a simple colostomy was made. A few days later the last segment of the sacrum with the coccyx was removed and the radical operation performed. I did most of my work by this method for several years but I am sure it is not possible, certainly not for me, to do anything like as complete operation by this method as by the one we are now using.

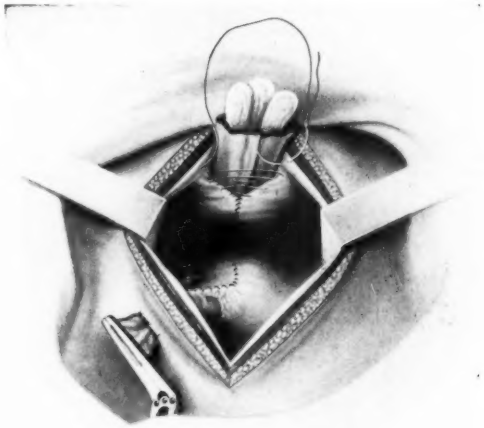

Fig. 10. The suture line contines to bring the parietal peritoneum from the sides of the narrow pelvis around the drain until the abdominal incision is reached, making the drain extraperitoneal.

Furthermore, as far as I know when this method was in vogue, no one was able to bring the operative mortality below 12 or 15 per cent. I appreciate that the operative mortality would vary to a great extent according to the completeness of the operation, but I think the degree of completeness can be definitely standardized as to the amount of tissue removed and also as to operability and inoperability by the very definite lines we have already suggested in the paper, and which Miles has so accurately diagramed.

The first question the operator has to decide is. What part of the operation is to be done at the first stage and what at the second? My belief is that the best results are obtained when the following principles are adopted for the first stage:

1. A completed physiological abdominal mechanism must be provided which is not to be disturbed afterward.

2. Complete devascularization of the involved and adjacent tissues from above. At the same time the devitalized structures must be mobilized and pushed down within easy reach of a sacral or perineal incision.

3. Separation of the retained physiological area from the discarded area by a quarantine pack which also serves the purpose of draining

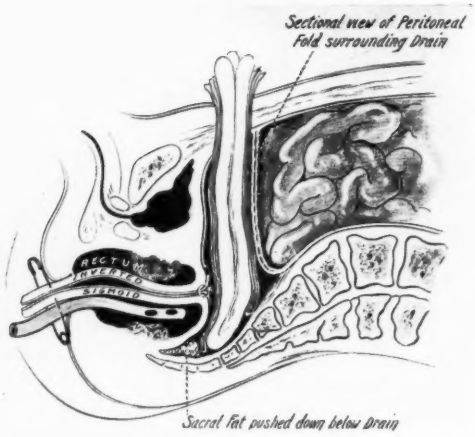

Fig. 11. Sectional view of drains which have been tubularized by the peritoneum of the pelvic wall. Fat in hollow of sacrum is pushed down, a drainage tube in rectum and inverted sigmoid held down by a safety pin.

Fig. 12. A large clamp has been passed through a stab wound in the posterior fornix of the vagina and is grasping a roll of gauze wicks which are to be drawn out through the vagina as a quarantine and drain.

away the débris of any sloughing tissue resulting from devascularization.

The first two principles were adopted in 1914 and published in the *Annals of Surgery*, April, 1915. The complete devascularization was followed by a sloughing of the devascularized tissue which first developed a large abscess and later broke into the rectum. While the patients lived through this septic period, it was anything but an ideal condition and a means for draining away the débris of the sloughing tissue became imperative if these principles were to be utilized. This was found very easy in the female by putting a drain into the hollow of the sacrum through an opening in the posterior fornix of the vagina, but in man it was necessary to drain at the lower end of the abdominal incision up through the peritoneal cavity. This was anything but ideal as it completely upset the idealism of the second stage in that the physiological mechanism of the abdomen was broken by having this drain in the peritoneal cavity. But it was soon found that the peritoneum of the narrow pelvis of a man was easily adapted to the formation of a peritoneal encasement with which to surround the drain. Simple rubber tube drainage was soon displaced by a larger protected pack of gauze wicks which served the purpose of separating the physiological from the pathological area and also provided efficient drainage. This third point made the bond which satisfied our idealism. This was described first in *International Clinics*[1]. Up to this time these three principles had been used only in those cases where the growth was located in the ampulla of the rectum proper or lower down and in which the lumen in the growth was sufficiently large to permit the passage of a good sized rectal tube for the purpose of inverting the sigmoid and drawing it down through the growth and through the anus. This procedure was not applicable in a considerable number of cancers located at that very difficult point, the rectosigmoid junction, because of the fact that cancers so located produce early obstruction.

Soon after the publication of this article, another advance step in technique was made so as to include this class of cases, which consists of separating the rectum and perirectal tissues from the sacrum and coccyx in the back and from the bladder and prostate in front. After doubly clamping the intestine well below the growth, the intestine was

[1] Vol. iv, series 31, December, 1921.

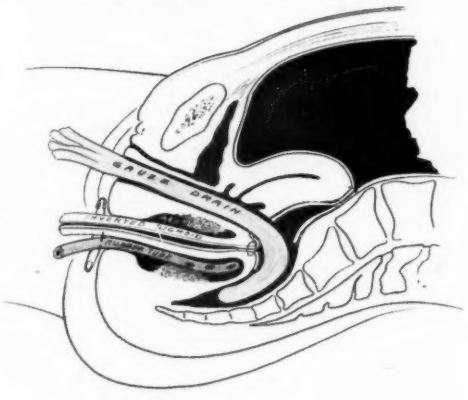

Fig. 13. Sectional view of quarantine drain surrounding inverted end of growth and emerging from the vagina.

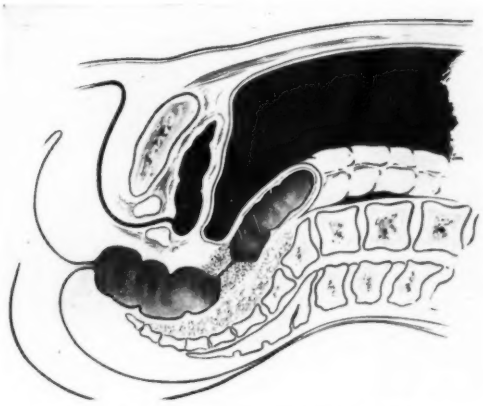

Fig. 14. High rectal cancer producing stricture.

severed between the clamps, leaving the lower clamp on the stub of the rectum and removing the growth with all the intestine and devitalized fatty tissue above. The lower clamp was allowed to remain on the distal end of the rectum and its long handle brought through the peritoneal encasement along with the drain or quarantine pack. This additional technique was presented before the American Medical Association in 1922, and published in *Annals of Surgery*, October, 1922.

Having proved the practicability of this step, it was easy to apply it to the only remaining class to which these principles had not been applied, namely, a low growth the caliber of which was not sufficiently large to permit of the passage of a rectal tube upward for the purpose of invaginating and bringing down the upper end of the sigmoid through the anus. In this class of cases, the steps of the operation are the same as the one just described, except that the part of the gut above the growth is doubly clamped and severed between the clamps, the intestine included in the upper clamp along with all the fat in the hollow of the sacrum is removed at the first operation while the lower clamp is brought out through the drainage tract along with the quarantine pack or a ligature may be tied around the stump of the intestine in place of the clamp. The growth remains until the second operation.

With the successful adaptation of these three fundamental principles to all these classes of cases, they become universal in all cases of operable cancer of the rectum, and this universal adaptability, we feel, justifies us in saying that we are dealing with principles rather than technique. As my experience has grown, I have gradually extended the amount of work done at the primary operation until it has become necessary to make a slight change in nearly all the illustrations dealing with technique.

There are three types or degrees of cancer of the rectum which require variation in technique in carrying out the three fundamental principles set forth. The most frequent cancer encountered in a routine clinic is a cancer located in the ampulla of the rectum which has not yet produced anything like a total obstruction. The second most frequent is cancer of the rectosigmoid in which obstruction is one of the earliest symptoms. The third in frequency is an extensive cancer located in or below the ampulla in which obstruction is marked but in which the growth is still removable. There is also a difference in the application of the third principle in man and in woman for obvious anatomical reasons. The first description of technique will, in order of importance, be that for an unobstructing cancer located in the ampulla of the rectum of a man inasmuch as cancer

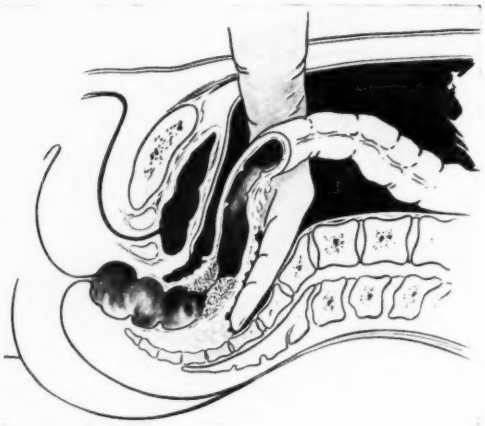

Fig. 15. Sigmoid has been mobilized. Peritoneum around the rectum has been cut, the bladder separated from rectum down to the prostate. Fingers of left hand being insinuated between rectum and sacrum down to point of coccyx.

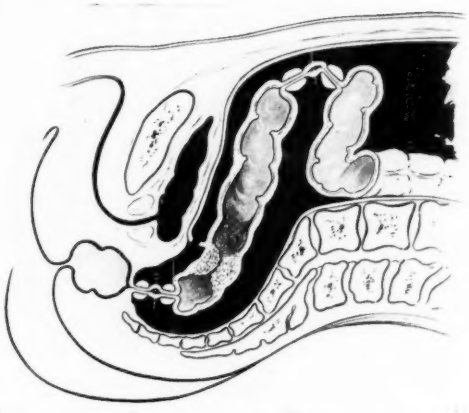

Fig. 16. The freed bowel is doubly clamped above by Payr's clamp and severed. Below, it is doubly clamped by long-handled clamps and severed, after which intestine with growth is removed.

of the rectum is much more frequent in men than in women. This for convenience will be referred to later in the paper as the "standard operation," inasmuch as it includes the three essential principles.

The first step in the technique of the standard operation is common to all cancers of the rectum.

1. Make a long right rectus incision about an inch to the right of the median line extending slightly above the umbilicus. Through this incision, a search is carefully made for metastatic growths in the liver and in the mesentery and retroperitoneal glands. The growth itself is carefully examined through the abdominal incision. If a metastatic growth is discovered in the liver or in the retroperitoneal space, it goes without saying that the plan for the radical removal of the rectum should be abandoned for palliative measures; likewise, if the growth involves the bladder or the firm pelvic wall. This long incision serves the purpose for exploration and for the manipulations of the operation. It is made on the right side because the permanent colostomy is to be made on the left side. It is always best to make a colostomy wound through a separate stab wound. By having the large operating incision on the right side and the colostomy on the left side, it is possible to protect the large clean wound from the infection of the colostomy.

Having decided to do the radical operation, the intestines are packed well up into the upper abdomen with moist gauze, the exception being the sigmoid which is brought entirely below the wall of gauze. With the left hand, the loop of the sigmoid is lifted high up, the peritoneum of the mesentery is cut down by insinuating the blade of a pair of blunt scissors beneath the peritoneum but external to the vessels. This incision goes down into the pelvis around in front of the rectum, at some distance from it, clipping the rectovesical fold near the bladder. Special angle scissors are made with long handles and a blunt or probe point on the lower blade (Fig. 3). The left forefinger is now inserted through the mesentery where the peritoneum has been cut and with the ends of the forefinger and thumb directed backward toward the promontory of the sacrum, and brought together, the superior hæmorrhoidal artery is felt about three-fourths of an inch in front of the bone. Its pulsation is about as strong as the radial artery. A large ligature, usually a double chromic catgut suture, No. 2 size, is passed beneath the artery with a long curved ligature carrier, the loop of thread is picked

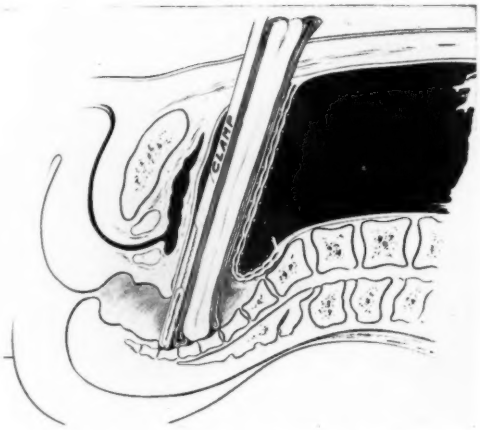

Fig. 17. The handle of clamp holding stub of rectum is brought out through peritoneal tube with cigarette drain.

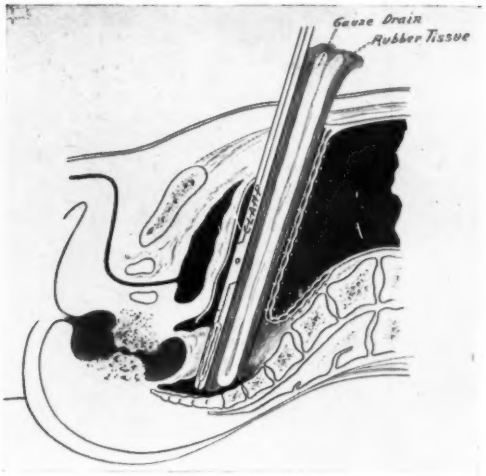

Fig. 18. Obstructing low cancer of the rectum. Devascularization and removal of sigmoid has been performed as in the standard operation. A clamp has been placed on the intestine above growth and brought out with the quarantine drain.

up on the opposite side and brought through the mesentery and around the large vessel and tied very tightly in order to squeeze out the fat in the mesentery. A similar ligature is placed an inch lower down. The mesentery, including the artery and vein, is now severed between the two ligatures. The sigmoid arteries coming from above are grasped in forceps and ligated so as completely to cut off the circulation from this source (Fig. 4). The fingers of the left hand are then insinuated between the ends of the severed superior mesenteric artery and also between the cut edges of the mesentery and pushed downward along the hollow of the sacrum, thus stripping off all the fat and connective tissue down to the tip of the coccyx (Figs. 5 and 6). If there is any return bleeding in the cut mesentery from below, this is stopped by grasping with forceps. After this separation, a large temporary gauze pack is placed in the hollow of the sacrum back of the rectum while the second major step of the operation is performed.

Before beginning this second step, we carefully determine the vitality of the circulation in the upper sigmoid which is to be used for permanent colostomy. It is very important to have a good circulation. This having been determined, an incision about 1.5 inches to the left of the median line and about 2 inches below the umbilicus, 1.5 or 2 inches in length, is made down through the left rectus muscle. A large Payr clamp is inserted through this incision, passed across within the abdomen to the main incision, where it grasps the proximal sigmoid at a point where it has been determined the circulation is good. Another clamp is placed just below, except that this clamp is in the main wound. The intestine is then severed with the cautery which is made to heat the blades of the clamp and thus sterilize it before it is drawn out through the wound (Fig. 7). It is pulled well up through the wound with the clamps where it is sutured to the layers of the abdominal wall, with fine double chromic catgut placed as a lock stitch, first sewing the peritoneum to the bowel wall, then the aponeurosis and finally a few interrupted sutures hold the skin to the peritoneal surface of the bowel. Usually about an inch of the bowel remains outside the skin.

When this part of the operation is completed, a rectal tube which was introduced into the anus by a nurse at the beginning of the operation, is now pushed up through the sigmoid to the point near the clamp on the distal gut. A purse string of linen is placed

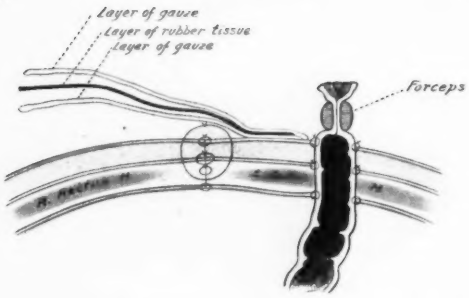

Fig. 19. Cross section of abdominal wall showing the collodion dressing and its relation to the wound and to the colostomy.

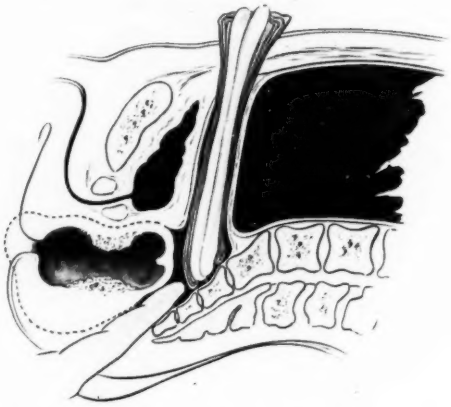

Fig. 20. Coccyx and last joint of sacrum have been removed. Finger inserted into the cavity around the drain.

around the gut below the clamp, the clamp is removed, the end inverted. The tube is pushed up to the end of the gut, its eye is located, a round needle armed with four double, strong linen thread is passed through the wall of the intestine, through the eye of the rectal tube, out through the end of the rectal tube, through the opposite wall of the intestine, is brought out and tied in a long loop fully an inch in length. The mesenteric fat on this distal gut is now trimmed off well down to the bottom of the pelvis, as much of the large sheet of fat which has been peeled off from the sacrum as possible may be ligated and removed. The artery forceps grasp the intestine on either side (Fig. 8), the nurse pulls on the tube, inverts the end of the gut down to the holding forceps when the forceps are made to grasp further down on the intestine, then the gut is pulled all the way down and out through the anus, where it is held taut in inversion by a clamp placed on it on the outside or by a large safety pin. This loop of thread which attaches the rectal tube to the inverted end of the gut is made long so that the tube precedes the inverted end in going through the narrows of the growth.

The fourth step in technique is to close all raw surfaces and openings so as to reduce to the minimum the danger of adhesions or postoperative obstruction. This is done as follows: First, the abdominal lumen to the left of the emerging sigmoid is closed by a double chromic catgut beginning in the lateral parietal peritoneum over the psoas muscle and with a continuous lock stitch bringing together the peritoneum of the front and back walls of this space over to the emerging sigmoid to which it is sewed. These sutures should be drawn very taut and should leave no possible space for failure to unite. An extra re-enforcement line of suture is often used. From this point, the continuous suture is carried on down, covering in the raw cut edge of the mesentric fat to the brim of the pelvis (Fig. 9). At this point in the operation a large cigarette drain, which is to serve the purpose of both drainage and a separating quarantine, is placed with its end in the bottom of the pelvis in contact with the hollow of the sacrum or coccyx. The suture is now continued, widening its scope so as to bring in the peritoneum of the lateral walls of the pelvis snugly around the drain. This suture continues forward until the peritoneum is closed around the drain up to the lower end of the long abdominal incision (Fig. 10). Thus all the raw surfaces and openings which would favor postoperative adhesions or postoperative obstruction have been closed, the devitalized tissue has been pushed down to the field of the second operation, and separated by an extraperitoneal quarantine which also takes the place of a drain (Fig. 11). The question of passing a drain up through the rectum through a puncture in the vault of the rectum above the growth into the cavity containing

Fig. 21. Fingers flexed on palm, separating rectum from bladder, prostate, and urethra.

Fig. 22. Space from which rectum has been removed, connected with abdominal drainage canal through which irrigation may be conveniently made.

the devitalized tissues, or inserting a drainage tube through the space between the rectum and the sacrum for the purpose of draining the devitalized area, was the first consideration, but experience caused me to decide in favor of the method described.

After the type of cancer with which we have just been dealing, the next most frequent and important cancer of the rectum is moderately advanced cancer located in the ampulla of the rectum of woman. The operation in woman differs from the standard operation just described in two points:

1. When the time comes to place the quarantine, a long forceps is passed into the vagina, a hole is made in the posterior fornix through the septum into the cul-de-sac. Enough wicks to make a roll of gauze an inch or more in diameter is put in the grasp of the forceps and drawn out through the vagina, leaving enough of the wicks inside the cul-de-sac to turn over the end of the inverted rectum into the hollow of the sacrum and coccyx where it is to form a quarantine, and is also to serve the purpose of a drain (Fig. 12). (As above stated, this same technique may be applied in the male by bringing the pack or drain out through a stab wound back of the rectum and omitting the drain in front. An objection to this would be a cut both in front and back leaving the patient no comfortable surface on which to lie while no drawback to the technique has been noticed.)

2. The uterus may be turned backward into the hollow of the sacrum and sewed around to the parietal peritoneum for the purpose of making a good abdominal floor and an intact peritoneal cavity (Fig. 13) or it is very easy to use the pelvic peritoneum back of the uterus.

The next cancer of the rectum of most importance is located in the rectosigmoid segment of the gut, in which obstruction is one of the earliest symptoms and in which it is impossible to pass a tube for the inversion of the end of the distal sigmoid (Fig. 14). In this case, the steps of this operation are the same as have been related in the standard operation except that the bladder and prostate are separated from the rectum in front (Fig. 15), and the rectum is mobilized on the side as well, after which a long clamp grasps the rectum as far below the growth as possible. Another clamp is placed between this clamp and the growth, after which the intestine is cut between the two and the severed sigmoid is removed along with the growth and the devitalized fat which has been lifted when mobilizing the rectum (Fig. 16). The handle of the clamp on the remaining rectum is

Fig. 23. The vaginal wall has been split. Finger is passing around the end of inverted bowel enucleating the growth without removal of the coccyx.

brought out through the lower end of the abdominal incision, the quarantine drain is placed in the same way and surrounded by the peritoneal encasement (Fig. 17), just as in the standard operation, while in woman the clamp and the drain would be brought out through the vagina.

The third type of cancer of the rectum, which is growing more infrequent as the knowledge of the disease is spread, is one in which the cancer is located in or below the ampulla, does not involve the genito-urinary organs, but has a lumen which is so obstructed as to prevent the introduction of a large rectal tube. In this case, the preliminary steps are the same as in the standard operation described except that the intestine instead of being inverted is grasped and cut between clamps above the growth, the lower clamp next to the growth being brought out with the quarantine or replaced by a ligature (Fig. 18), the upper one being removed with the severed sigmoid and devitalized fat.

Having completed the vital parts of the operation, the large abdominal incision is closed, the Payr clamp on the protruding end of the sigmoid is removed and an Ochsner forceps applied to hold the intestine closed until it is desired to open it. The forceps is fastened to the abdomen by adhesive tape.

For the protection of the main wound from the contents of a colostomy when the gut is opened, I have for a long time used a collodion dressing which is put on as follows: The skin between the wound is thoroughly dried with pure alcohol followed by dry gauze. A layer of gauze, one thickness, about 8 inches by 4 inches, is laid over the main wound with its edge on the skin between this wound and the colostomy wound. This edge is fastened to the skin for about an inch with collodion. A sheet of rubber tissue about the same size is laid over the gauze but not quite reaching the edge. Then another layer of gauze, the size of the first, is laid on top of the rubber tissue and its edge fastened to the edge of the first layer of gauze and the rubber tissue by more collodion. Another layer of rubber tissue is laid on top of this collodion to prevent it sticking to the gauze dressings. A roll of gauze is then laid on top of this between the covered wound and the colostomy (Fig. 19). This dressing thoroughly protects the clean wound from the colostomy so that the wound should heal without breaking down.

The requirements of the three fundamental principles laid down for the first stage of the operation having been completed, the operation is halted until a complete anatomical and physiological abdominal mechanism has been re-established. By this we mean that the sutured peritoneum above the quarantine has firmly healed, the abdominal wound has healed, the artificial anus is firmly established and acting well, the patient's pulse and temperature are practically normal and the patient's digestive apparatus is functioning normally. This is usually completed about the tenth day after the operation. Occasionally, we do the operation a little earlier but sometimes the second operation is delayed several days longer until the patient is in a good healthy condition. In the meantime the enemy, the cancer, has been largely cut off from its support, is quarantined from the rest of the body to a large extent, and is almost harmless for the time being. The most startling and spectacular thing that takes place during this interval between operations, is the line of cleavage between the tissues which have been devitalized and

are to be removed and the normal structures which are to remain. This change makes the second operation a minor affair.

When we are ready for the second operation, we still have in place the quarantine, especially in man for it is allowed to remain as a landmark in doing the second operation. In woman, where the retroverted uterus has been used to form the floor of the cavity, the pack may be removed from the vagina a few days before the second operation in order to get rid of the odor.

The patient, if a man, is placed on an operating table which breaks in the middle. He lies on his face with both head and feet lowered in the jack-knife position. Incision is made in the center of the lower part of the sacrum down to within an inch of the anus, where it divides and surrounds the anus and all the anal muscles; any bleeding skin vessels may be caught with forceps; the coccyx and lower end of the sacrum are exposed; the last joint of the sacrum and coccyx removed with bone forceps; the fingers of one hand are insinuated between the sacrum and the ischiorectal fat until the cavity containing the quarantine is reached (Fig. 20). Usually there is a good deal of pus and débris in this cavity, which is entirely ignored as harmless. The fingers are then pushed over farther around the end of the inverted rectum and above the growth and the rectum, and all are peeled out with an ease and completeness which is not believable until one has actually had the experience (Fig. 21). The usual time required for the whole operation from the time of the first incision in the skin until the specimen is entirely removed is about 5 minutes without any necessity for hurrying (Fig. 22).

In woman, we usually use the Murphy method and split the vaginal mucous membrane and perineum. If the growth is on the posterior wall of the rectum, the mucous membrane of the vagina is simply lifted and allowed to remain. If the growth is in the front wall of the rectum, the posterior wall of the vagina comes away with the rectum. After this incision in the vaginal wall is made, the fingers of the left hand are passed through the drainage opening, made to curve

Fig. 25. Photograph showing wound on eighteenth day after operation. Patient allowed to be up.

around the inverted rectum, follow down past the coccyx and peel out the growth with the rectum and the muscles around the anus (Fig. 23), which are cut as far distal to the growth as possible. Without any hurry, this operation has been performed in less than 5 minutes. In no instance is there any bleeding, except that around the anus and anal muscles, which requires the use of artery forceps. I have several times found it unnecessary even to use these. I think I am safe in saying that the total loss of blood for both operations would not average more than 4 ounces and at no time are we in danger of any serious loss of blood. The clean cavity left after removal of the rectum in this way is very surprising. Nature for some reason has, during this interval, made a line of cleavage which is very definite and the fingers, without particular care will follow this line of cleavage. After the rectum is out, the vesiculæ seminales, vas deferens, and bladder are in plain view, practically without bleeding. The cavity along the hollow of the sacrum is almost as smooth as the bone itself.

In case the cancer has been very extensive and has probably penetrated the fascia propria, we use a large dose of radium packed in the gauze. In some cases we have used the radium at the time of the operation and at other times we have used it 4 days later with a second pack of gauze. The radium is applied by using two or three 50 milligram tubes of radium in the ordinary brass containers,

arranged in tandem and sewed to a roll of gauze. In packing the wound, about three-fourths of an inch of gauze is placed between the radium and the prostate and bladder before the gauze containing the radium is put in place. The gauze is then packed lightly on top of the radium which is allowed to remain 24 to 30 hours, depending upon the dose desired. Radium applied to a fresh wound in this way retards the healing at the external opening which we believe is an advantage, for no matter how large the opening on the outside, there is a tendency for it to heal ahead of the upper end of the cavity.

I have been asked: "If this second operation is so simple, why not do it at the first operation?" In answering this question, I may say in the first place that the operation performed without this interval of waiting is by no means so simple, for the lines of cleavage just described are not formed. The definiteness of the line of cleavage around the fascia propria of the rectum and the ease with which the second operation is performed is very amazing to anyone doing the operation for the first time or even observing its performance. The cause of this line of cleavage or œdematous area is probably due to the complete shutting off of the circulation from above which very largely devascularizes the perirectal tissues inside the fascia propria at the first operation. This line of cleavage seems to be comparable to the line of demarcation in gangrene and occurs at the point at which the normal circulation outside the fascia propria encounters the devascularized area at the fascia propria. It does not occur in the absence of devascularization and as far as I know it does not occur in the absence of drainage or the quarantine which of necessity follows devascularization. In the second place, the additional operation would almost double the amount of raw area to be repaired at the first operation and would, therefore, make a much heavier draft on the vital forces of the patient.

Formerly, we partially sewed up the perineal wound. This we have abandoned and now leave the wound entirely open. After the removal of the rectum, this immense cavity is packed with a large five-yard gauze tape which is allowed to remain about 4 days, when it is removed. The quarantine may be removed at the time of the second operation or when the big pack is removed. For purposes of cleanliness, irrigation in the case of man is made through the opening through which the drain was brought out (Fig. 22). The cases in which we have left the wound wide open have done better in the long run than those in which we have attempted to close the wound partially (Fig. 25). The patient may be up in a couple of weeks, the drainage is perfect and time is the only essential yet remaining.

During the past 10 years in an experience of more than one hundred cases of cancer of the rectum treated by all methods, I have operated on 47 patients by the method described with two deaths, the eighth and the thirty-second cases. I am not yet prepared to report on final results but from the unofficial reports I have received, I feel sure that the ultimate reports are going to be as good as I have received from any other cancer involving the abdominal viscera. I am certain that an individual afflicted with cancer of the rectum has many more chances of long life than has one afflicted with cancer of the stomach or with cancer of the uterus. I feel in connection with this subject that no operation can be more thorough than the one we have described and the low mortality so far shown is exceedingly gratifying. In short, cancer of the rectum, instead of being one of the most hopeless of cancers, must now be considered one of the most hopeful, and particularly if the doctors first seeing the case will examine the rectums of patients with the finger as routine when the complaints justify. The diagnosis can nearly always be made early enough to offer a good chance for a permanent cure.

RECURRENT DISLOCATION OF THE SHOULDER

With Report of Cases

By W. RUSSELL MacAUSLAND, M.D., Boston, Massachusetts
Surgeon-in-Chief, Orthopedic Department, Carney Hospital

RECURRENT dislocation of the humeral head occurs most frequently in early adolescence. It is generally preceded by a history of trauma, the original injury having been sufficient to produce a subglenoid or subcoracoid dislocation of the head. Men are more prone to the affliction than women and it is found more commonly in the relaxed type of individual. Epileptics are particularly subject to it. Only rarely is there a case of double dislocation.

PATHOLOGY

The pathology varies widely in different individuals.

Capsule. The most constant lesion, which may be of several varieties, is located in the capsule. In some cases there is actual avulsion of the capsule from its attachment, while in most cases it is raggedly torn, usually in its anterior and inferior parts, and stretched to a point where, even in repair, an actual pouch is found on the inferior and anterior surface. As this portion of the capsule is not supported by muscle it is easy for the head to slip out. The pouch acts as a receptacle for the head, when the patient's arm is abducted or elevated.

Some operators have described a capsular-periosteal separation, in which the capsule and a part of the glenoid pad are continuous with the periosteum detached from the scapula.

Bone. Chief among the bony abnormalities that have been observed, is the defect of the humeral head. Many surgeons since the time of Joessel (35), Cramer (10), and Loebker (43) have demonstrated by resections on both the cadaver and on the living that the humeral head is normal in only its anterior part. A wedge-shaped notch exists on its posterior side, which is caused by the striking of the head against the glenoid margin when luxation occurs. Grégoire (26) considered that this groove in the head was the main cause of recurrent dislocation.

In some cases the lower glenoid margin is found worn off. In others there may be loose bodies or avulsion of the great tuberosity. In some of the severer cases an actual pulling away of the inferior capsular ligament with its bone attachment may take place, thus lessening the ridge of the glenoid cavity and making displacement easy.

Muscle. Occasionally the muscles supporting the joint and holding the head against the glenoid cavity are found torn or atrophied. The resulting altered muscle tension is undoubtedly connected with dislocation. The pectoralis major, the latissimus dorsi, and the teres major keep the head pressed against the glenoid surface, while the supraspinatus, infraspinatus, and the teres minor act as the lateral rotators, and the subscapularis as the medial rotator. In a posterior dislocation, the detachment or rupture of the subscapularis contributes to the loss of support. In cases in which the insertions of the supraspinatus and infraspinatus are torn off at the first luxation, relaxation and loss of tone result. The teres major and latissimus dorsi then tend to pull the head downward and when the muscles contract, the head slips over the glenoid margin.

SYMPTOMS

The main complaint in all cases is the fear that displacement will occur on abduction of the arm. This fear seriously handicaps the patient in any occupation that involves the possibility of arm elevation and is a serious obstacle in sports.

The frequency of recurrence varies in different cases. Some dislocations recur only once in several months, while others may occur daily. Occupation has much to do with the frequency. Sometimes turning in bed will

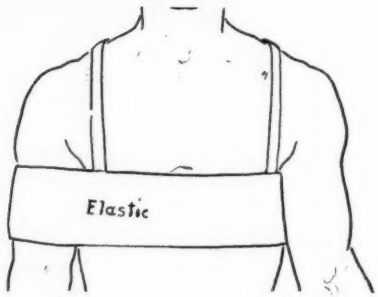

Fig. 1. An elastic surcingle.

produce a dislocation. Fortunately cases that have luxated several times may be reduced easily.

Some muscular atrophy of the coracobrachialis, triceps, deltoid, and especially the posterior part of the supraspinatus and infraspinatus may be observed. There may be a slight limitation of motion, frequently in abduction.

Pain is usually present just after actual displacement.

The diagnosis is made purely on subjective symptoms, voluntary spasm, and protection against dislocation on any attempts at abduction, together with the history of recurrent attacks without trauma.

CONSERVATIVE TREATMENT

After the initial displacement the shoulder is reduced and held to the side for a period of at least 2 weeks. In recurrent cases an elastic surcingle 3 to 4 inches wide is placed around the chest and over the affected arm several inches below the shoulder. This serves as a constant reminder and resists the abduction of the arm (Fig. 1). The surcingle should be worn constantly for 6 months, and during this time local therapeutic measures, baking and massage should be practised. If only two or three displacements have occurred, this treatment often succeeds.

When displacement has recurred too many times, and especially when the displacement recurs only on slight exertion, conservative treatment is of no avail. Operative interference offers the only means of overcoming the difficulty.

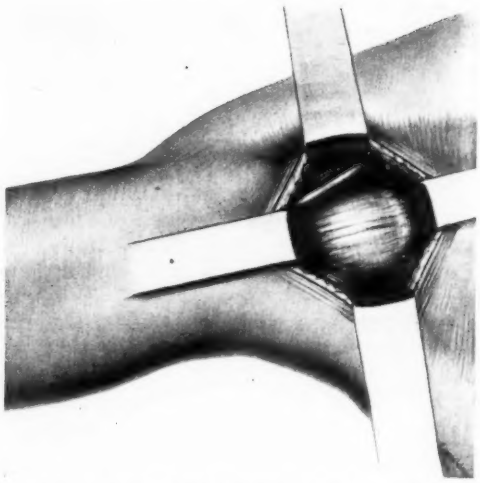

Fig. 2. The 4-inch incision made posterior to the vessels and parallel with the arm.

OPERATIVE TREATMENT

Usual Two-day Preparation

The arm is abducted to an angle of 90 degrees with the body. The humeral head is then easily felt as prominent in the axilla. The vessels are located and a 4-inch incision made posterior to them and parallel with the arm (Fig. 2). A plexus of veins is usually found over the head and these are cut and retracted. The subscapular muscle is then exposed directly over the humeral head. It may be retracted as a whole or it may be divided in the direction of its fibers and the portion overhead retracted. The capsule over the head is then in view, and a complete exposure of the capsule should be obtained. About halfway between the glenoid and the middle of the humeral head, a curved incision is made parallel to the glenoid. After the head is examined and the pathology studied, it is replaced. The capsule is overlapped well and the sutures placed, but not actually tied until the arm is brought down to an angle of about 45 degrees from the body (Fig. 4.) Chromic gut is usually used for this purpose. The subscapular muscle is then returned to normal and the skin closed with interrupted catgut No. 1. Dry dressing is applied and the arm held at the side for 6 weeks

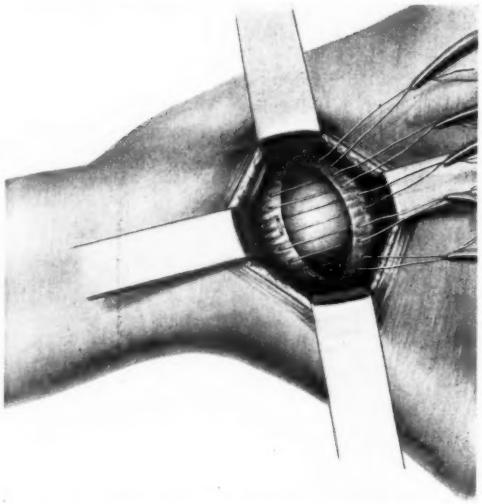

Fig. 3. Capsule overlapped and sutures in place.

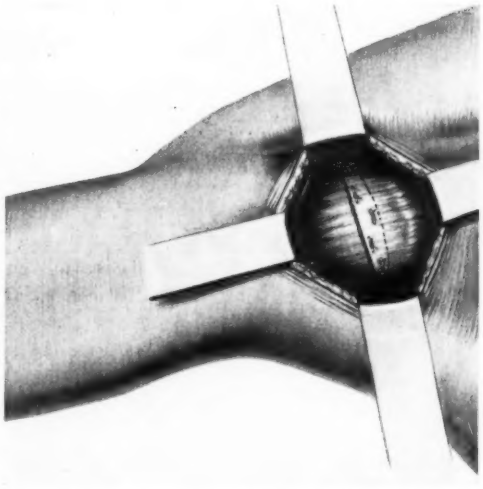

Fig. 4. Capsule overlapped and sutures tied.

without motion. Then restricted use is allowed, taking care to protect the arm from forced abduction for a period of 3 to 4 months (Fig. 2).

REPORT OF CASES

CASE 1. R. M., an epileptic suffered from dislocation of both shoulders. When I saw the patient in January, 1921, he reported that the right shoulder was dislocated about twenty times during the previous year. Abduction of the shoulder was limited by spasm. The left shoulder first slipped out 4 years ago and dislocation had recurred about forty times. The left shoulder was operated on elsewhere twice without relief, and a third operation prevented the shoulder from slipping out again, but resulted in a considerable limitation of motion.

Treatment. An operation following the technique described was performed on the right shoulder in March, 1921. Six weeks later the anteroposterior motions were normal and abduction was one-half normal.

In June, 1921, 3 months after intervention, the patient, in falling, displaced the right shoulder anteriorly. Another operation was done in August, 1921. After several falls during epileptic attacks, resulting in dislocation, an excision of the head of the humerus was done in September, 1922.

Result. In June, 1923, when I examined the patient, abduction of 80 degrees was possible in the left shoulder, rotation in adduction was normal, rotation in abduction was possible for a few degrees each way. There had been no recurrence. The patient had wrenched the right shoulder 1 week before. Abduction without pain was impossible beyond 50 degrees. A few degrees of internal and external rotation were possible. There was marked atrophy of the deltoid. There had been no recurrence.

CASE 2. E. R., dislocated his left shoulder while playing football in 1908. From then up to the time of admission to the hospital (February, 1911) the shoulder was dislocated fifteen times.

Treatment. An open reduction, using the usual technique was performed in 1911.

Result. Twelve years later the patient wrote me that he had never had any trouble with the shoulder and he used it as freely as the other one.

CASE 3. E. D., dislocated both shoulders while playing football in 1912. When I saw the patient 3 years later, the right shoulder gave no symptoms, but the left had slipped out repeatedly since the injury. The shoulder was dislocated eight times during 3 months, once while sleeping.

Treatment. An operation following the usual technique was performed in 1915.

Result. Up to December, 1921, there was no recurrence nor any disability, except for a slight weakness in doing heavy physical work. Late in December the shoulder came out once during gymnastic exercises. Up to the present time (June, 1923) there has been no further trouble, but the patient uses the arm with caution.

CASE 4. E. L., while playing football in 1911, dislocated his left shoulder. Recurrence took place six times after the original dislocation, often during sleep.

Treatment. An open operation was done, following the usual technique.

Result. About 9 months later the patient reported having no trouble, except that the arm was not as strong as the other.

CASE 5. S. S. fell from a horse in 1913 and injured her shoulder. Since this injury dislocation had recurred repeatedly, once while dancing, once while swimming.

Treatment. An open operation following my usual technique was done in May, 1916.

Result. The patient wrote several years after the operation that she had had no trouble with the shoulder, although at times it felt weak. She is a counsellor in a camp.

CASE 6. L. R., while wrestling, dislocated his left shoulder and 6 months later the shoulder came out again. Before I saw the patient in 1915, dislocation had recurred fifteen times.

Treatment. An open operation was done in which the capsule was quilted.

Result. Two years after the intervention, the patient showed a perfect result and the arm had never given him any trouble.

HISTORY

Prior to capsulorrhaphy, braces and bandages were first used in treatment, but as they allowed only limited motion, they were finally disregarded.

Hippocrates (32) tried to form a cicatrix to contract the joint space, by entering the articular cavity with a red hot iron. Malgaigne (46) and others practised myotomy in the hope of producing an inflammatory condition.

Albert (2), in 1879, first tried arthrodesis; he was followed by Wolff (84), Karewski (36), Mueller (50), and others. Cramer (10), in 1882, made a complete resection of the humeral head. There were many imitators of his technique, particularly in Germany.

But all these methods were finally abandoned because they resulted in diminution of function or were considered unsurgical.

Capsulorrhaphy without arthrotomy. In opening the joint for resection, the dilated condition of the capsule attracted the attention of the operators. Several methods, with or without arthrotomy or capsulotomy were then devised to obtain a diminution of the capsule. Ricard (59), in 1892, first tried capsule reefing without opening the joint, by forming a permanent fold in the anterior portion of the capsule by means of three silk sutures placed vertically. No relapse followed and normal mobility resulted in two cases.

Many surgeons followed his technique or modifications of it. Certain operators used a posterior incision instead of the anterior one. Steinthal (74), Paladini (54), Mueller (50) Francke (22), Payr (55), Lardennois (41), Nélaton (51), and Thomas (76) operated in a similar manner.

Dehner (13) and Krumm (39) used a posterior vertical incision to bring the humeral head to the posterior cavity rim and then contracted the capsule at about the approach of the head into the rim.

Beck (5), in 1903, plicated the capsule on its anterior surface and in addition carried a silver wire through a hole drilled in the head of the humerus and in the acromion. The wire was removed in 5 weeks. The result was perfect.

Mauclaire (47) and Berger (6) modified the method, Berger by fixing the capsule to the tip of the acromion to reinforce it, and Mauclaire by making two plications, one vertical and one horizontal.

Trethowan (77) successfully plicated the capsule in a case, but he found the operation very difficult.

Picqué's (57) method differed from Ricard's in that he formed a fibrous-muscular capitonnage on the anterior face of the joint by passing three sutures of horsehair or silk through the capsule. He discriminated between the cases in which there was a swelling of the capsule and those in which there was a notch in the humeral head and a capsular-periosteal separation. In the latter cases, resection followed capsulorrhaphy. De Fourmestraux (21) made the same discrimination.

Legueu (42) relieved an epileptic patient by reefing the capsule with horsehair. Three months after the operation, the patient fell, causing a new luxation. Picqué (57) used his method on the case and obtained a successful result.

Bliss (7), in 1906, tightened the capsule in a case in which there had been fifty recurrences, by means of including an elliptical portion in silk strand sutures. A perfect result was obtained.

In 1908, Stimson (75) used Ricard's method successfully, making a permanent fold by means of three silk sutures placed vertically. Meyer (48) used the same procedure in one case.

The same year, Dahlgren (11) traced the efficacy of simple capsule contraction and found there had been no relapse in twenty-five of the forty-one cases which he collected from literature. All of these cases had not been due to the enlargement of the capsule, but to other causes such as the tearing off of the muscles, especially the outward rotators.

Wilmanns (82) had two interesting cases in which he obtained perfect cures through simple interference and contracture.

Kosloff (37) herself, suffered from a recurrent dislocation of the shoulder. She was operated on by Duval, who sutured the capsule vertically with linen thread. The patient, after 4 years, used the arm with the same facility as the sound one. Kosloff believed capsulorrhaphy was justified in cases where, aside from the laxity of the capsule, there existed a capsular tear, a capsular-periosteal separation, or a lesion of the anterior edge of the glenoid.

Walther (78), in 1918, plicated the capsule by means of three horsehair sutures passed from the inner side outward through the entire length of the capsule. His patient could pursue his occupation, although there was some limitation of motion.

Rivière (61) secured a perfect result by suturing the capsule and fixing it to the subscapularis without opening the joint.

Durand (17), in 1919, reported a case in which he made a vertical and horizontal fold in the capsule. No relapse followed and the patient had normal motion.

Capsulorrhaphy following arthrotomy. As these methods did not permit the exploration of the joint, which several surgeons believed to be important, Samter (64) and Mikulicz (49) then recommended the splitting of the capsule vertically and the drawing of the medial part over the lateral part.

Grothe (27) incised the anterior portion of the capsule and narrowed it by overlapping the edges of the incision.

MacKinnon (45), in 1907, in the case of a farmer whose shoulder dislocated frequently in sleep, introduced mattress sutures into one margin of the incised capsule and tied the sides in such a way that one flap came under the other. The patient made a complete recovery. In discussion of this report, Dr. Wright said he had successfully quilted the capsule transversely in the case of an epileptic patient.

Steeg (73), in 1910, reported a case in which, after exploration of the joint, he introduced four sutures of catgut vertically into the capsule. The result was successful; the patient had full function of his arm.

Schultze (67) in his operation, after blunt dissection of the deltoid on the outside, freed the capsule and drew the edges of the wound one over the other. In this way he doubled the anterior capsule.

Worcester (85) overlapped the edges of the capsule in three patients, with successful results.

Henderson (29), in 1921, issued a report of nineteen cases treated in the Mayo Clinic. The method used was based on the principle that the anterior inferior portion of the capsule is torn and as this portion is unsupported by muscular insertions, recurrence is easy. Therefore, this section of the capsule was strengthened. In some cases the pectoralis major was lengthened. The condition of sixteen patients was decidedly improved; 50 per cent of these were cured. It was too early to report on the other three cases.

Of a group of eight patients on whom he reported in 1917, one had dislocation nearly 6 years after the operation and another patient had relapse in 5 years. Both, however, were better than before the operation.

Dreesmann (15), Goldmann (25), Wilmanns (82), Samosch (63), Hildebrand (31), and Schultze (67) tried capsule doubling or reinforcing. Wiesinger (81) used the incision of the capsule and tamponade to secure reduction.

Capsulorrhaphy after excision. The first capsulorrhaphy after excision was tried by Gerster (23) in 1883. He removed a piece of capsule by a semi-elliptical incision and united the capsular wall, as well as the muscles and skin, by three tiers of interrupted catgut. The patient was cured.

Bardenheuer (4), in 1886, excised two pieces of capsule, and secured good results.

In 1895, Burrell and Lovett (8) removed an elliptical piece and sutured the capsule to

shorten it. A second case was reported in 1897. They believed it important to divide the tendon of the insertion of the pectoralis major for three-fourths its breadth, to allow uncovering the capsule.

Warren (79), Dawborn (12), Baldwin (3), and Albee (1) secured good results using Burrell and Lovett's procedure.

Mueller (50), Haegler (28), Kuh (40), Kronacher (38), Goldmann (25), and Donati (14) reported cases in which they excised pieces of the capsule. Some surgeons combined the methods of Gerster and Mikulicz.

Between 1909 and 1921 Thomas (76) issued several reports summarizing his cases and describing his technique. The capsule was contracted by sutures, by overlapping, or by excision. At first he used an anterior axillary incision, but later recommended the posterior route, as he found the capsule could be approached more easily in this way. Also the wound was smaller, and motion returned more rapidly. In the cases in which the method of excision was employed, Thomas allowed cicatrization across the gap made in the capsule, then contracted the portion to within normal length, and stretched it by suitable exercises. In all cases he found evidence of wearing in the posterior part of the head and glenoid. In some it was necessary to do a partial excision of the head.

Because of this wearing, which will prevent complete return of the joint to normal, Thomas considered the terms of success only relative. In 1921, he issued a report covering the accumulation of 4 years' observations. Of forty-four shoulders which he had treated, eighteen had been epileptic cases. There had been no dislocation in eleven cases after capsulorrhaphy, done in the most recent case 4 years before the time of the report, and in the first case 11½ years before. Another case had been successful after excision of part of the humeral head. Three were failures. In the non-epileptic group, there were twenty-two successful cases after capsulorrhaphy, done in the first case 13 years before, and in the last case 3 months before. There were two failures.

Capsulorrhaphy plus treatment of other lesions. Some surgeons did not consider capsulorrhaphy sufficient as they found other lesions present and believed it necessary to do a simultaneous operation to give the joint support.

Winiwater (83), in 1905, presented a young man on whom he had operated 2 years before. One incision was made along the upper edge of the clavicle, and a second made obliquely between the major pectoralis and the deltoid muscle. Two folds were made in the capsule by means of sutures. Then, to oppose dislocation of the head, he united the upper edge of the subscapularis to the lower edge of the minor pectoralis by a series of sutures, thus stretching the two muscles over the capsule. The major pectoralis was returned to its place and sutured at its clavicular and deltoid insertion. The functional result was excellent; in 4 months the patient had complete use of his arm.

Other surgeons strengthened the capsule by nailing the head of the biceps on the lesser tuberosity to strengthen the restraining apparatus in front of the joint. Werndorff (80) used this method in connection with capsular plication.

Seidel (68), in 1913, reported a case in which he separated the subscapularis muscle, took out an oval piece of capsule and sutured the edges of the capsule together. He then covered the entire front of the joint with a piece of transplanted fascia and sutured it to the deltoid and subscapularis. The patient died some time later and examination showed the flap had been preserved. Payr (55) also reported one case using this technique. Schultze (67) was of the opinion the fascia flaps were necessary.

Still others reduced the capsule and sutured the outward rotators. These operations treating the muscles are chaotic. Mueller (50) tried to revise the external rotators at their appendage behind the deltoid or subscapularis.

Perthes (56) twice used reefing of the capsule and firm fixing of the torn external rotators on the great tuberosity. In the four cases reported, he varied his technique, according as the muscles were torn, the cavity rim broken, or the capsule dilated. If the muscles were torn from the tuberculum majus, he

replaced their insertions on the head of the humerus by means of V-shaped nails. The tendons were nailed directly to the bony surface or attached to the bows of the nails with silk. If the glenoid rim was torn, it also could be fixed by means of V-shaped nails driven into the neck of the scapula.

Hildebrand's (31) operation was concerned with the changes of the joint cartilage. He deepened the cavity with a sharp curette, and thus obtained a prominence of the medial glenoid edge.

Besides capsulorrhaphy, other methods were tried, some to change the tension of the dilated capsule or others to construct a ligament to hold the joint in place.

Roepke (62) reefed the tendon of the subscapularis muscle to secure better support around the capsule. This was handled by an incision on the outside axillary border. Selig (69) proposed reefing the supraspinatus tendon as he considered this muscle played an important part in dislocation. Sever (71) recommended suturing the subscapularis tendon and dividing the pectoralis major tendon. Capsulorrhaphy may be performed in connection with these steps, but it is not necessary. Complete revision of the pectoralis major was done in forty cases. There were no relapses or loss of motion.

Joseph (34) used fascia lata strips to construct a ligament that would prevent luxation of the head. In two cases, the results were satisfactory and motion, which he had feared might be lost, was good. Schmieden (66) also secured a favorable result by this method.

Semken (70) made a vertical incision 1 inch external to the anterior border of the deltoid. A tunnel was made under the subscapularis and a graft of fascia lata from the thigh drawn through and its upper end fastened with interrupted catgut sutures to the upper part of the capsule and its lower end to the subscapular head of the triceps muscle. This flap thickened and contracted and hindered the anterior excursion of the humeral head.

Loeffler (44), Sandes (65), and Herforth (30) advocated fascia flaps to gain security. Evatt (19) recommended a silk cord to connect the humerus and the axillary border of the scapula.

Treatment of muscular contraction. Several surgeons believe that operation should be directed to the relief of the disturbance of the co-ordination in the muscular contraction. At the surgical congress in Germany in 1909, Clairmont and Ehrlich (9) proposed a new method—myoplasty—to struggle against the action of the deltoid. The opposing muscular traction was obtained through the formation of a flap on the inner portion of the deltoid muscle which was passed from behind forward under the neck of the humerus, and its end sutured to the same muscle in front. This flap acted as a sling to hold the joint in place.

Clairmont reported four cases; Major Dunn (16), one case; Platt (58), one case; and Thomas (76), three cases. Only one of these cases (Clairmont's) relapsed. Seven cases by Gibson (24) gave favorable results.

R. Jones (33), in 1912, is reported to have done two of these operations. The flap was carried through the quadrilateral axillary space and fastened to make a sphincterlike ring about the neck of the humerus. Immobility for 2 months followed. One case recurred from lack of immobility or insufficient fixation of the muscle. The second case was a success.

Finsterer (20) secured satisfactory results in seven cases, using muscle flaps. Ollerenshaw (52) advocated this procedure.

Other surgeons attempted the division of the tendon of the subscapularis muscle. Spencer (72) reported one successful case and Openshaw (53), three satisfactory cases.

Another type of operation was based on changing the leverage of the two powerful muscles which act as the dislocating force. Young (86) was the advocator of this method, which was suggested by Allis. The incision was made in the space between the deltoid and pectoralis major muscles. The attachment of the latter muscle was divided at its lower half. Through a second incision the latissimus dorsi muscle was reached and the lower half divided. The arm was put in wide abduction for 10 days.

Eden (18) found that in many cases the tearing of the capsule with bone from the cavity rim was ground for the return of the

luxation. In these cases, he considered that capsule reefing, suturing of the external rotators or muscle plastic, could not prevent recurrence. The joint capsule must be fastened into position and the shape of the cavity restored. This was obtained by building a hindrance of a piece of bone from the tibia. The torn capsule was fastened in its old place by sutures. Two patients have had no relapse after 3 years.

CONCLUSION

From a study of the literature of this subject, it appears that the treatment of recurrent dislocation of the shoulder has been one of varying technique. No consistent method, adaptable to a large number of cases, has been reported. On the contrary, each treatment differs according to the importance attributed by the surgeon to the pathological condition of the bone, capsule, and muscle. The majority of cases have been treated by some form of capsulorrhaphy, and in most of them satisfactory results have been obtained.

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EXTRAPLEURAL THORACOPLASTY IN THE TREATMENT OF BRONCHIECTASIS[1]

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BRONCHIECTASIS is a disease of the bronchi. Pathologically it is characterized by inflammation resulting in a primary thickening, then a destructive thinning and stretching of the bronchial walls. The cavitations so produced may be cylindrical, spherical, or saccular. The surrounding lung parenchyma is probably always involved in the inflammatory process. A specimen may show an extensive cirrhosis alone or secondary areas of acute suppurative pneumonitis or multiple abscesses (Fig. 1). Solitary abscess cavities may form by ulcerative perforation of the bronchial walls. Bronchiectasis may be localized or diffuse, unilateral, or bilateral. In a series of 416 cases, 36 per cent were unilateral, 28 per cent bilateral, and in 36 per cent the distribution was uncertain. Unilateral cases only are suitable for surgical treatment, and the determination as to location and extent of involvement may be very difficult.

With the exception of the rare, true congenital type the disease is always of infectious origin. It occurs as a sequel to pneumonia especially when complicating pertussis, and the exanthemas, following bronchopneumonia, particularly of the hæmolytic streptococcus type, and as a late sequel to septic infarcts often wrongly diagnosed postoperative pneumonia. It also occurs from primary infection of a bronchus by inhaled foreign body or septic material in childhood, and during or following operation under general anæsthesia. Probably a large proportion of the cases of uncertain origin and of the so-called congenital type beginning in early childhood are due to foreign body infection.

The disease is characterized chiefly by periodic paroxysmal cough with evacuation of large amounts of purulent sputum, and in varying degree by fever, leucocytosis, anæmia, weight loss, night sweats, and hæmoptysis. In this series of 416 cases hæmoptysis was present in 26 per cent. The condition of many of these patients, some with foreign body in a bronchus, had been diagnosed tuberculosis and treated for months in tuberculosis sanitariums.

The physical signs may be those characteristic of consolidation or cavitation; or may be so slight that no conclusions can be drawn from them either as to the presence or localization of the lesion.

Roentgenograms may show streaky shadows due to increased density along the bronchial walls, a dense basal shadow due to a localized bronchiectasis (Fig. 2), abscess with associated bronchiectasis (Fig. 3), scattered circumscribed areas of increased density

[1] Read before the meeting of the Clinical Congress of the American College of Surgeons, Chicago, October 22 to 26, 1923.

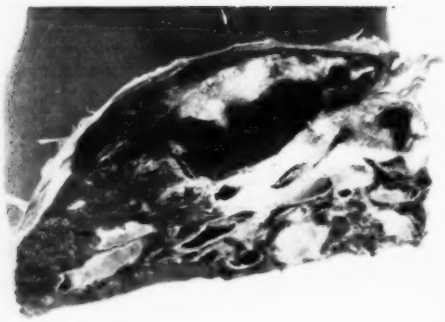

Fig. 1. Multiple pulmonary abscesses and bronchiectasis. (Case A390233.)

due to pneumonitis or multiple discrete abscesses, or a dense diffuse shadow produced by a thickened pleura masking the lung condition (Fig. 4). The roentgenograms revealed entirely normal conditions in 15 per cent of the cases in this series.

Diagnosis depends chiefly on the presence of paroxysmal cough with evacuation of large amounts of sputum, and by the exclusion of pulmonary tuberculosis, abscess, and empyema with bronchial fistula. One important sign, to which Lemon has directed attention, is the ability of the patient to produce sputum at will by assuming a head down position.

Medical treatment of bronchiectasis has been palliative only. Surgical treatment has been limited to a small minority of patients, and only a few isolated patients have been cured. Among surgical methods that have been attempted are drainage, pneumothorax, extrapleural collapse, and lobectomy. That drainage would prove useless in cases of

TABLE I.—RESULTS OF SURGICAL TREATMENT

Operation	Collected cases	Per cent cured	Per cent improved	Per cent not improved	Per cent dead
Drainage	133	33	6	27	25
Drainage	53	0.4	....	....	62
Pneumothorax	23	....	26	74	....
Extrapleural thoracoplasty	42	19	66.6	4.8	0.6
Pneumonectomy	58	17*	....	....	52

*17 per cent of 48 cases in which operation was performed.

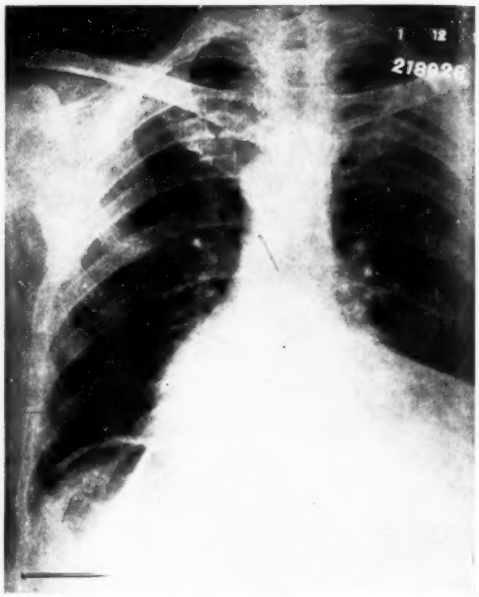

Fig. 2. Localized bronchiectasis proved by operation. (Case A218928.)

diffuse bronchiectasis could have been predicted from a consideration of the pathological anatomy. It was found to be not only useless but highly dangerous. In individual series the mortality reached 78.6 per cent (Table I). Pneumothorax has proved a safe procedure, but of only temporary benefit in the cases so far reported. Extrapleural thoracoplasty was tried many years ago and condemned. Brauer is quoted as having said that he had never observed, nor seen reported in the literature, a case of bronchiectasis cured by thoracoplasty. The relatively poor result may probably be ascribed to an operation not sufficiently extensive to secure collapse of the diseased portion of the lung, and the high mortality to too much being attempted at one time. Lobectomy was heralded as the operation of choice, particularly after the development of differential pressure anæsthesia designed to obviate the dangers of open pneumothorax. The expectations have, however, not been realized, and the operation seems so far not to be justified by its results. In 58 cases reported in the

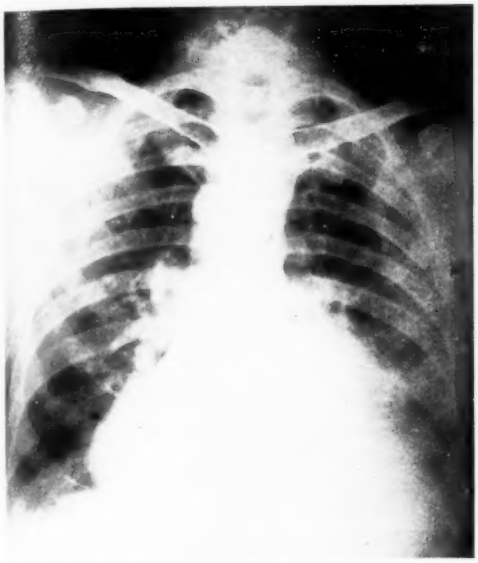

Fig. 3. Roentgenogram of chest in same case as shown in Figure 1. Multiple abscesses and bronchiectasis. (Case A390233.)

Fig. 4. In this case a pulmonary suppuration with secondary pleuritis was masking the lung shadows. (Case A383008.)

literature 30 patients died following operation, an operative mortality of 52 per cent. Furthermore in only 17 per cent of the 48 cases studied by Graham as to end-results was a cure achieved. The operation according to its most enthusiastic advocates is suitable only for selected patients, leaving out of consideration the large majority who are in greatest need of relief.

In considering, in the light of these results, what could be done for these patients who continually confront us it seemed to me that thoracoplasty deserved further trial. A partial thoracoplasty has yielded encouraging results in the treatment of unilateral pulmonary tuberculosis. It seemed to me that by making the collapse more complete, improvement might reasonably be expected also in bronchiectasis, and by bringing about the collapse in stages the operative mortality might be reduced. In cases in which relief of symptoms did not follow, lobectomy could then be attempted, seemingly with less risk. Accordingly I performed an extensive graded thoracoplasty on two patients, both having generalized unilateral involvement of long standing and raising from 500 to 1000 cubic centimeters of purulent sputum in 24 hours. Both patients improved so markedly that indications for such a hazardous operation as lobectomy were entirely set aside. I then adopted an extensive extrapleural thoracoplasty as a tentative routine procedure. The results to date have exceeded expectations. All patients with bronchiectasis so far operated on have been improved to a greater or lesser degree and none has died.

The operation which I have evolved consists of the subperiosteal resection of the whole length of the third or fourth to the eleventh ribs inclusive, in six stages under combined local, nerve block, and gas or oxygen anæsthesia (Fig. 5). The object of the resection is to secure permanent collapse of the diseased portion of the lung. The ribs are resected subperiosteally because by so doing there is less risk of penetrating into the pleural cavity. The pleuræ are often of normal thinness and not adherent, so that a pneumothorax would follow tearing of the parietal pleura and this would probably add materially to the operative risk and to the danger of

Fig. 5, a.

Fig. 5, b.

Fig. 5. a and b. Posterior, lateral and anterior incisions. Note absence of deformity and good function of arm. Whole length of the third to the eleventh ribs inclusive was resected. Complete symptomatic cure. (Case A299907.)

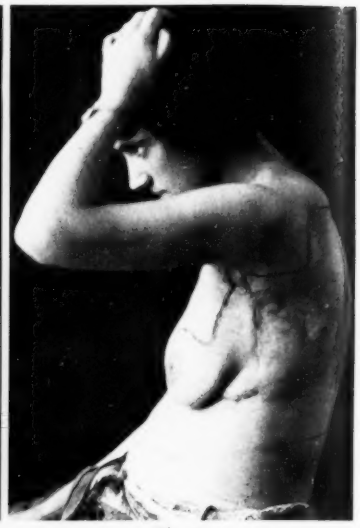

Fig. 6.

Fig. 6. The dark line shows limits of anæsthesia which followed the injection of the nerves with alcohol, about 2 months after the nerve trunks were injected. (Case A426477.)

secondary empyema. A partial regeneration of rib also protects the collapsed lung.

A posterior resection is performed first because it produces the greatest relative amount of collapse of the chest wall and because it affords access to the proximal portion of the intercostal nerves (Fig. 7). These nerves are injected with 95 per cent alcohol, which produces an anæsthesia which lasts for many weeks. A relatively painless postoperative course is thereby obtained which is of great importance when a series of five or six operations is to be performed (Fig. 6). A painful postoperative course is apt to destroy the patient's morale. Such prolonged anæsthesia also makes possible the painless resection of the anterior and lateral segments. Cutting the nerves is objectionable because it produces permanent anæsthesia and results in paralysis of the abdominal muscles.

Eight to ten centimeter segments of the anterior extremities are next resected to the costochondral juncture. The remaining lateral segments may be reached by a straight incision in the axillary line which avoids cutting any of the muscles except the serratus. The posterior, lateral, and anterior resections are performed usually each in two sittings. The wound is closed in layers, a small drain being placed and removed in 24 hours. The different stages are performed at intervals of about 7 days, the patient sitting up often on the day following the operation. The postoperative course is usually relatively painless. One feature of paramount importance in the postoperative management is the gravity evacuation of bronchial secretions at regular intervals of from 3 to 4 hours beginning immediately after operation. One patient developed a sudden attack simulating pulmonary œdema, became exceedingly cyanosed and comatose,

TABLE II.—ETIOLOGY

	Cases
Influenza	5
Pneumonia	2
Bronchitis	1
Empyema with bronchial fistula	1
Tonsillectomy (ether anæsthesia)	2
Appendectomy	1
Posterior gastro-enterostomy	1
Foreign body in bronchus	2
Whooping cough	1
Congenital	2
	18

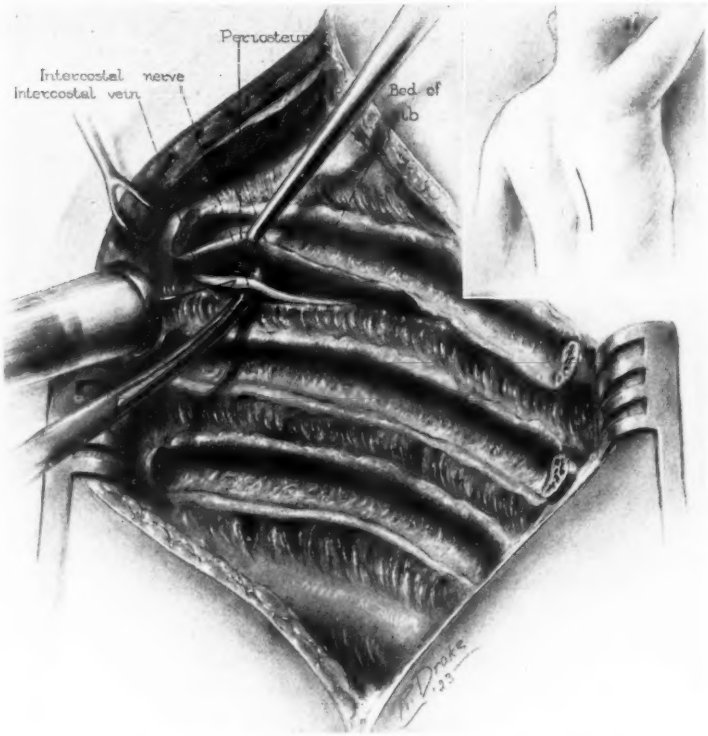

Fig. 7. Injecting 95 per cent alcohol into the nerve trunk close to its origin at the head of the rib.

and would have died from drowning in her own secretions had she not been promptly inverted into a head down position.

During the last 3 years I have performed a graded extrapleural thoracoplasty on 18 patients with bronchiectasis. In several the initial lesion was most probably a pulmonary abscess, but at the time of examination the findings were essentially those of bronchiectasis. Eleven of the patients were males and seven were females. Seven patients were between 12 and 20 years, seven between 21 and 30, two between 31 and 40, and two between 41 and 50 (Table II).

The cases of influenza all occurred during the period of the epidemic, which fact points to a hæmolytic streptococcus infection. In those following pneumonia the infection was of the recurrent type; in one there had been five attacks. In both cases that followed tonsillectomy the early history was that of pulmonary abscess, but all the findings at the time of examination, years later, were those of bronchiectasis. The patient whose pulmonary symptoms followed appendectomy finally developed bilateral abscesses of the chest wall, due to actinomycosis infection. The primary condition was probably actinomycotic bronchiectasis. The foreign body, in one instance, was a carpet tack, which had been present 7 years before being coughed up, and the other was a head of wheat, at least partially coughed up 18 years ago. In two cases the onset of symptoms dated from early childhood. These may have been cases of unrecognized aspiration of a foreign body.

It was difficult to determine the amount of sputum evacuated in 24 hours with any degree of accuracy. In many cases there was a history of considerable fluctuation during

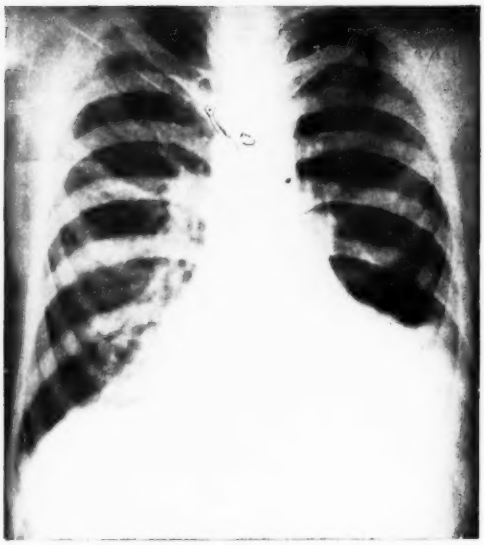

Fig. 8. Before operation. Practically complete symptomatic cure. (Case A421177.)

Fig. 9. Bronchiectasis. After operation. (Case A421177.)

periods of weeks or months. During observation at the Clinic the average amount was from 100 to 250 cubic centimeters in 5 cases, from 250 to 500 cubic centimeters in 10, and from 500 to 1000 cubic centimeters in 3.

The sputum was more or less foul in all cases. Hæmoptysis in varying amounts was present in 11. Many of the patients had been treated in sanitariums for tuberculosis for prolonged periods, the erroneous diagnosis of pulmonary tuberculosis having been made, apparently largely because of the history of hæmoptysis.

RESULTS

There was no postoperative mortality, and, up to the time of recent reports, no deaths. There were no serious postoperative complications, no marked deformity, and no loss of function of arm and shoulder. No patient refused to continue with the series of operations because of the pain or loss of morale. On the contrary, several became impatient when for any reason an operation was postponed beyond the appointed time (Figs. 8 and 9).

Seven cases in which the thoracoplasty was not completed 6 months ago are excluded in the study of the results to date. Eleven patients have been under observation from 6 months to 3 years. The duration of symptoms in these cases was from 2½ to 20 years, the sputum averaging from 250 to 1000 cubic centimeters. The decrease in sputum has averaged 75 to 100 per cent. Three patients have had only attacks of cough and sputum with hæmoptysis in one of these, and two have had practically no cough and no sputum. With the one exception of the patient with the actinomycosis, all show gain in weight and lasting improvement in general condition.

COMMENT

While massive collapse of the lung has been achieved with marked relief of symptoms in all of these cases, it must be recognized that the diseased bronchi and lung tissue remain as a possible source of further acute exacerbation of infection. The persistence of cough and sputum may be due to an unrecognized involvement on the other side, but in some cases reported there are physical and roentgenological signs of persistent cavitation in the collapsed lung. If the symptoms persist, extirpation of the diseased tissue, either by resection or by cautery, is contemplated.

ADENOMYOMA OF THE RECTOVAGINAL SEPTUM[1]

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AND
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FOR many years it has been a recognized fact that epithelium resembling uterine epithelium may be found in other pelvic organs and on other pelvic or abdominal viscera outside of the uterus. The etiology of this epithelium is one of the most interesting problems in gynecology, the chief theories beings as follows:

1. Von Recklinghausen believes them "embryonic remnants," i.e., structures derived from the mesonephric tubules and duct (wolffian body and duct). The reasons for this belief are that there are found both in adenomyomata and in the wolffian body: (a) narrow straight canals with ciliated epithelium—the collecting tubules of the mesonephros; (b) wide tortuous tubes with cuboidal epithelium —the secreting tubules; (c) distention tubules; and (d) fusion of many tubules to form a collecting tubule giving a similar arrangement to the parovarium.

2. Kossman states that adenomyomata arise from accessory muellerian ducts.

3. Cullen believes that they arise from the mucous membrane of the uterus and could prove in all his cases of adenomyoma of the uterus at some place in one of serial sections a definite outgrowth of uterine mucosa toward the adenomyoma. Of the rectovaginal septum, he says: "We know nothing as to the origin of these tumors but it is certain that their glandular elements are identical with those of the mucosa of the body of the uterus.

4. Von Franqué and R. Meyer say that adenomyoma is the result of previous inflammation with ultimate pinching off of the newly formed mucosa or gland structure. In all cases there must be: (a) injury; (b) regeneration; (c) infiltrative growth of epithelium producing epithelial structure. In other words, the source of this apparent misplaced epithelium is the overlying epithelium which has been injured and in the reparative process the glands have resulted. Proof for this is the finding of fragments of elastic tissue and the presence of mast and plasma cells in the center of the mass. When asked to account for decidual metaplasia (transformation), R. Meyer shows that this is not specific for muellerian tissue from which the uterus is derived but does occur in peritoneal adhesions, on the appendix, on the omentum, on the ovary, and elsewhere.

Further proof is that the following authors have demonstrated epithelial heterotopia as the result of inflammation: (1) Orth, in suppurating follicles of amœbic dysentery; (2) Ziegler, in similar regeneration of epithelial growth in bowel abscess; and (3) Richter, in ileocæcal tuberculous ulcer. Therefore, any epithelial structure can have the function of heterotopia.

5. Sampson says that adenomyomata are the result of regurgitation of endometrial tissue through the patent fallopian tubes during menstruation with, and occasionally without, implantation on the ovaries which are usually the intermediate host prior to further transplantation and growth elsewhere in the pelvis and abdomen.

The following cases have come under our observation.

Case 1. Mrs. E., age 31; married 7 years, widow 6 months; three children, youngest 18 months; deliveries normal, puerperiums normal, no miscarriages; menstruation began at the age of 18, was of the 28-day type; it was usually profuse and lasted 7 to 10 days; it had decreased somewhat since marriage.

Her present complaints were: severe backache, "bearing down" pains in pelvis, and return of menstrual profuseness to pre-marriage state.

Pelvic examination showed relaxed vaginal outlet and canal, cervix normal, uterus slightly larger than normal, horizontal in position with a small degree of prolapse, appendages apparently normal. Some tenderness in cul-de-sac of Douglas on firm pressure.

Rectal examination. Lying high in the pelvis, posterior to the cervix, an indefinite nodule could be

[1] Read before the Chicago Gynecological Society, December 21, 1923. (For discussion, see p. 7.)

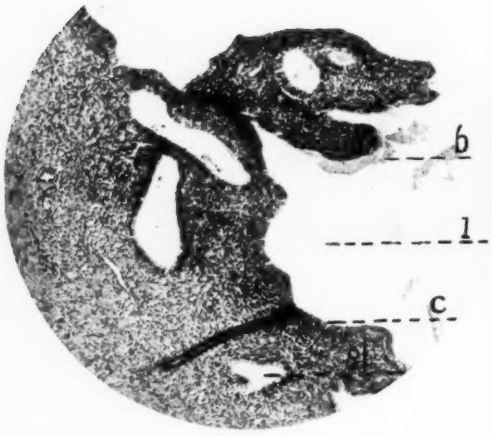

Fig. 1. Case 1. Photomicrograph (×70) showing part of large cyst lined with single layer of columnar epithelium of endometrial type. *c*, Cyst wall; *gl*, small gland; *b*, blood; *l*, cyst lumen.

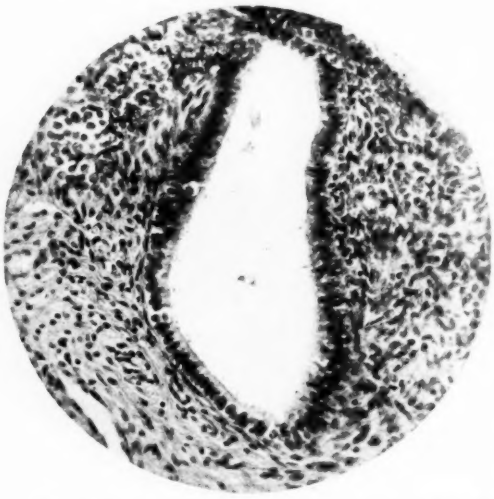

Fig. 2. Case 1. Photomicrograph (×230) of a small gland shown in Figure 1, with typical columnar epithelium of endometrial type actively functioning and a stroma of connective tissue and muscle fibers.

palpated, which moved away from the examining finger and which could not be more sharply outlined even with combined abdominal and rectal examination, except under anæsthesia when it could be sharply outlined.

Diagnosis. Adenomyoma of the rectovaginal septum.

Operative findings. Abdominal section. There were no abdominal or pelvic adhesions, the uterus was normal and in horizontal position. The tubes and ovaries were normal, but a soft cystic mass about 4 centimeters in diameter, freely movable under the peritoneum, could be felt in the rectovaginal septum. The peritoneum was incised and the tumor exposed about 2 centimeters from the cervix. The growth was easily "shelled" out of the peritoneal incision which was a little larger than absolutely necessary so as to avoid opening the cyst. Very little hæmorrhage attended its removal and there was no apparent connection with the cervix, nor was there any damage to the rectal wall.

Macroscopically, the tumor showed a cystic growth 3 centimeters in diameter which on section revealed a definite round cyst filled with the typical chocolate colored fluid found in the chocolate cysts of the ovary; about a dram of fluid escaped together with a small clot of old blood. The cyst wall was smooth, dark gray in color, 0.25 centimeter thick and firmly adherent to the adjacent stroma.

Microscopic examination showed a large cyst made of a single layer of columnar epithelium of endometrial type, with large cigar-shaped nuclei in the base of these columnar cells. There is definite blood pigment and necrobiotic red blood cells in the lumen of these cysts. There are a few smaller similar cysts or glands scattered irregularly around these major cysts. Surrounding these glands there is a stroma of connective tissue and muscle fibers arranged in irregular whorls. There are no round cells or other signs of inflammation present in the hæmatoxylin and eosin stained section. In those sections stained with methyl green pyronin, plasma and mast cells are seen profusely scattered throughout the tissue.

We have in this case an adenomyoma of the rectovaginal septum containing a typical hæmatoma or chocolate cyst of the endometrial type. There was apparently no connection with the uterus, the growth was some distance from the cervix and not adherent to it, nor was the rectovaginal septum obliterated. The uterus was not removed so we had no opportunity of sectioning it, but there were no palpable fibroids. With the pelvic organs normal, no cysts of the ovaries, and with the peritoneum over the tumor smooth, shiny, and unbroken, we feel we can exclude the possibility of this being a growth of transplanted endometrial tissue from the uterus primarily or secondarily from an intermediate host, the ovary. The epithelial lining of the cyst resembles that of the uterus near the internal os

but there is no mucosal stroma such as is normally found in the endometrium. These adenomata of endometrial type, however, were still functioning or had done so for some time as evidenced by the finding of blood and bloody fluid in the cyst.

CASE 2. Mrs. H., age 27, had been married 10 months, and was never pregnant; menstruation began at 14 years, it was of the 28-day type, profuse for first 2 days and scanty for 3 days. She had some dysmenorrhœa, and had had luecorrhœa since girlhood but it was more pronounced since marriage.

The present complaints were marked dyspareunia and a constant severe pain in the vagina which was relieved by warm douches.

Pelvic examination. Vulva and vagina were negative except for a white odorless discharge. The cervix was normal in size, shape, and position. There were no erosions or lacerations. There was a marked rigidity posterior to the cervix and pressure caused severe pain. Bimanual examination was difficult owing to marked tenderness over lower abdomen, but we were able to map out a large mass on the left side, the fundus of the uterus was not palpable but pressure on above mass was transmitted to the cervix and anterior fornix. No mass could be determined on the right side.

Rectal examination. A large tender mass was palpated posterior to and intimately connected with the cervix, firmly fixed and adherent to the rectum.

Laboratory examinations. Repeated smears were negative for gonococci; blood Wassermann was negative; and there was a leucocytosis of 12,700.

Fig. 3. Case 1. Photomicrograph (×1) of specimen removed in Case 1, showing distinct cyst formation.

Pre-operative diagnosis. Adenomyoma of rectovaginal septum and left ovarian cyst.

Operation. Abdominal section. No intestinal adhesions were found and the abdomen was negative. Pelvis. The right ovary and tube were normal, the left ovary was cystic, about 10 centimeters long and 5 centimers in diameter, firmly adherent to the rectum at level of internal os and to the posterior uterine wall. The uterus was normal in size and position, but the cervix was fixed by rectal adhesions.

The left ovary was separated from the uterus and rectum with difficulty and as is usual in these cases it was ruptured in the process. About 2 ounces of dark chocolate colored fluid escaped. The rectovaginal septum was obliterated and the rectum densely adherent to the cervix to a little above the internal os. There were also several organized blood clots in the ovary where the fluid had escaped.

Fig. 4. Case 2. Photomicrograph (×95) showing adenoma of endometrial type in ovary made of glands of single layer columnar cells. *c*, Ovarian stroma; *g*, glands.

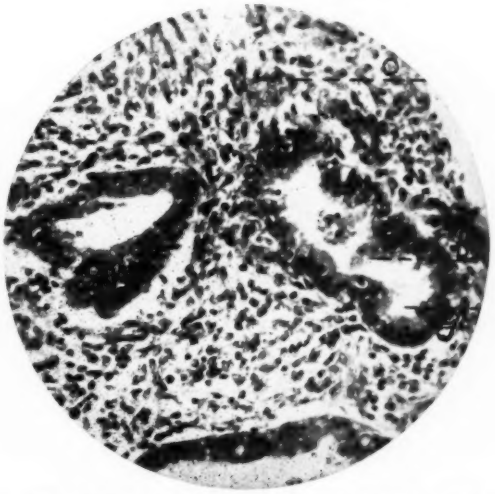

Fig. 5. Case 2. Photomicrograph (×250) showing in better detail glands of endometrial type of single layer columnar cells. *b*, Blood; *c*, ovarian stroma; *gl*, glands.

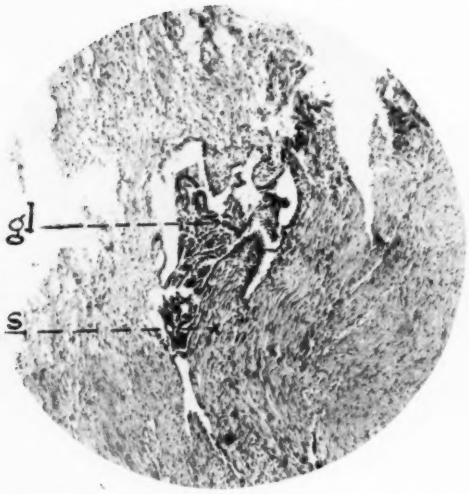

Fig. 6. Case 2. Photomicrograph (×95) showing adenomyoma of rectovaginal septum. In this case the rectovaginal septum was obliterated and the rectum adherent to the cervix. *s*, Stroma; *gl*, glands.

Fig. 7. Case 2. Photomicrograph (×275) showing in detail single layer columnar glands of adenomyoma with stroma of comparatively old connective tissue with a little muscle fiber. *s*, Stroma.

The microscopic findings were: In this section of the ovary there are several glands made of single layers of columnar epithelial cells (of endometrial type), with large cigar-shaped nuclei in their bases, and the lumen of these glands contains red blood cells and blood pigment. There is profuse hæmorrhage throughout the ovarian stroma which is most marked beneath the stratum germinale and an unusually large number of large endothelial phagocytes some of which are full of red blood cells.

The tissue taken from the rectovaginal septum also shows several glands which are also made of single layers of columnar epithelial cells and embedded in a stroma consisting of mature connective tissue with a little muscle fiber. This tissue is undoubtedly much older than the stroma surrounding the adenomatous structures in the ovary.

We have in this case the macroscopical and microscopical picture of hæmatomata or chocolate cyst of the ovary of the endometrial type associated with an adenomyoma of the rectovaginal septum. The origin of this interesting pathology is rather difficult to explain because with some reservations it can be placed in any of the etiological groups previously mentioned. The physical, operative, and microscopic findings show definite inflammatory changes. The adenomyoma invaded the uterine wall but did not penetrate to the mucosa. Clinically there were no symptoms of involvement of the endometrium. When we consider the chocolate cyst of the ovary, densely adherent to the adenomyoma, with the endometrial adenomata in the ovary, the type involved is apparently that explained by Sampson's theory, i.e., that the adenomyoma was transplanted endometrial tissue with the ovary acting as the intermediate host. We would feel that Sampson's theory was conclusive for this case except for two facts: first, we found endometrial type tissue deep in the normal ovarian stroma; and second, the stroma surrounding the adenomyoma of the rectovaginal septum was much older than that of the ovary. May we not then be justified in concluding that the adenomyoma of the rectovaginal septum and the endometrial adenoma of the ovary developed possibly simultaneously or at least independently of one another?

Case 3. This was previously reported and it was noted at that time as being an apparently isolated adenomyoma of the rectovaginal septum; the pelvic findings in this case were negative except for the adenomyoma which was palpated rectally. In this instance repeated sections throughout the entire uterus failed to reveal *any* adenomatous tissue, which should definitely eliminate the uterine mucosa as a source of the adenomyoma and further substantiate the conclusions drawn in Case 1.

Fig. 8. Case 3. Photomicrograph (×65) showing adenomyoma of rectovaginal septum with glands arranged in somewhat papillary order. *gl*, Papillary glands; *s*, stroma with round cell infiltration.

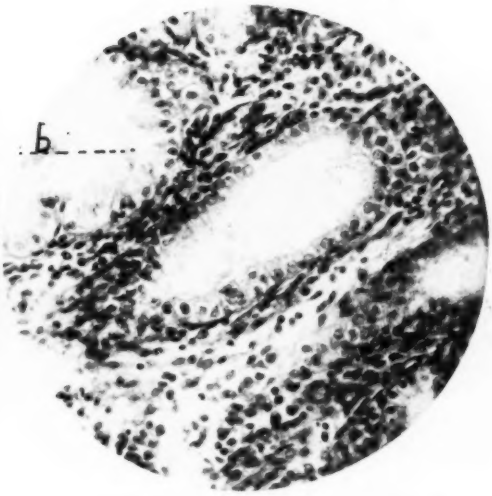

Fig. 9. Case 3. Photomicrograph (×250) showing in detail the single layer low columnar cells comprising the glands and the stroma infiltrated with round cells. *b*, Blood.

Microscopic examination of this section shows a large number of single layer columnar adenomatous structures which are arranged in a papillary and tubular fashion but throughout the growth are orderly and nowhere wildly proliferative. The individual cells of these glands are all about the same size and shape; the cytoplasm and nuclei have similar staining qualities throughout the section; there is a moderate round-cell infiltration; the stroma consists of irregular whorls of muscle and connective tissue.

Diagnosis. Adenomyoma of the rectovaginal septum.

Case 4. Mrs. W., age 51, had been married 21 years, had never been pregnant. Soon after marriage she had had four attacks of severe pelvic pain at short irregular intervals but no recurrence for many years. The menopause took place 1 year ago, and there had been no menstruation since.

Family history. Father died at 73 of heart trouble, mother died at 49 from cancer, 3 brothers are living and well, one sister died at 38 of cancer.

The present complaints are irregular intermittent recurring attacks of "stomach trouble" during which the patient vomits two or three times. After the vomiting ceases the attack subsides and the patient is perfectly well. These attacks have recurred for 18 years. At onset they were about 2 years apart but now they recur at intervals of 6 months. There was no history of constipation. The Wassermann, urine, and blood were all negative.

Physical examination. There is marked tenderness over the right lower quadrant of the abdomen with a firm mass palpable in the region of McBurney's point, apparently connected with the right adnexa.

Pelvic examination showed a small, normal cervix, a uterus three times larger than normal, irregular in outline, with a nodule on the right. There was a large mass on the right side involving both tube and ovary. The left tube was enlarged, easily palpated, and tender to slight pressure.

Rectal examination confirmed the vaginal but also demonstrated severe pain on pressure posterior to the cervix.

Operation. Abdominal section. Several loops of the small intestine were adherent on the right side to the parietal peritoneum, to the tube and ovary, to the posterior surface of the broad ligament, to the anterior and posterior surface of the uterus, and to other loops of small bowel, so as to form a mass about 8 centimeters in diameter. The appendix was retrocæcal and was involved with the cæcum in this mass. There were also a small fibroid of the uterus, a bilateral large hydrosalpinx, and ovaries of normal size buried in easily torn adhesions. The intestinal adhesions were due to small, easily torn, extremely vascular, friable tissue islets varying in size from 1 to 2 centimeters in diameter.

Microscopic examination of the islets of tissue removed from the small bowel show active inflammation, granulation tissue, and round-cell infiltration. There is also present small glands made of single layer columnar epithelial cells resembling those of the endometrium. There are red blood cells in the gland lumen.

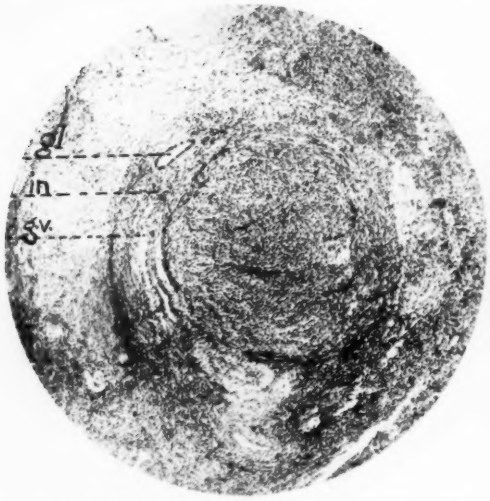

Fig. 10. Case 4. Photomicrograph (×75) showing small gland of single layer columnar epithelial cells buried in inflammatory tissue. *in*, Inflammatory stroma; *gl*, gland; *g.v.*, granulation tissue blood vessel.

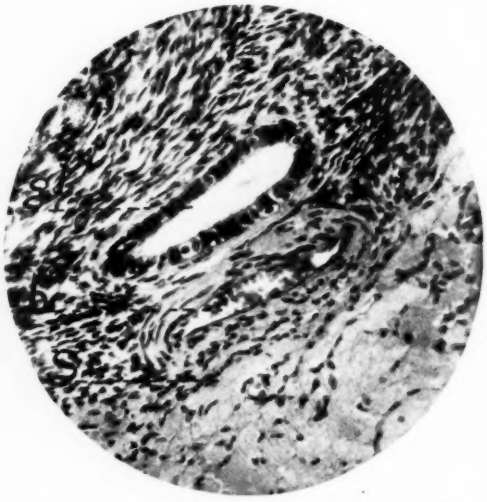

Fig. 11. Case 4. Photomicrograph (×250) showing in detail the gland of single layer columnar cells in stroma of immature connective tissue and small blood vessel. *gl*, Gland; *b*, blood vessel; *s*, stroma.

We feel that this is a type which may be explained by R. Meyer's theory of epithelial heterotopia secondary to inflammatory changes.

CONCLUSIONS

1. Hæmatomata or chocolate cysts of the endometrial type may develop anywhere outside of the uterus provided the normal ovarian function is present to act as a stimulus.

2. In all of these cases there was definite evidence of inflammation varying from the chronic inflammatory process seen in Case 1 to that seen in Case 4 in which newly formed granulation tissue was the predominant characteristic.

3. The growth in Case 1 apparently was not a transplant or outgrowth from the uterus but appeared to be a developmental rest because of its isolation and the ease with which it could be enucleated. Later the presence of plasma and mast cells indicated chronic inflammation.

4. These growths are not only very interesting from an etiological and histological standpoint but are of marked clinical significance. Their removal has relieved many distressing symptoms.

5. From the study of this group of cases together with others now under observation, we feel that the preponderance of evidence is greatly in favor of R. Meyer's etiological theory that these growths are of inflammatory origin, notwithstanding the fact that the presence of tissue in situations where it is not normally found may cause an aseptic inflammatory reaction.

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GRANULOMA INGUINALE

With the Report of a Case Observed in Chicago[1]

By S. S. SCHOCHET, M.D., Chicago

THE object of this communication is to call the attention of the gynecologist to the not uncommon occurrence of granuloma inguinale in the United States, and to emphasize the necessity of a more careful study of ulcerations of the external female genitalia. Diseases that are regarded as tropical in character have not received sufficient emphasis in our medical teaching with the result that many of these conditions are masquerading under various diagnoses, viz., syphilis, tuberculosis, etc.

Granuloma inguinale, described also as serpiginous ulceration, groin ulceration, granuloma venereum, ulcerating granuloma of the pudenda, granuloma ulcereaux des organes geniteaux, ulcerative vulvitis, and granuloma inguinale tropicum has been endemic in the eastern part of the United States for the past 50 years, and although not designated as such, was observed by the late Dr. Taylor, of New York, and Dr. Horwitz, of Philadelphia, in the past 25 years (31). Clinically, granuloma inguinale was first described in the States by Grindon (15) in St. Louis, Missouri, in 1913, but credit is due to Symmers and Frost (42) for the first complete clinical and laboratory study in this country (1920). They actually established the fact that this disease is not peculiar to the tropics.

Granuloma inguinale is necessarily so little known to the medical profession in a temperate climate, that it may be of value to include a brief résumé of its history and geographical distribution with a short account of the etiology, pathology, clinical forms, and treatment of this affection.

DEFINITION

It is usual to begin the description of a disease by defining the morbid condition. In the case of granuloma inguinale, however, its true etiology has not been definitely established, and a discussion of the morbid process would be of more practical value. The various synonyms thus far given to this condition are misleading.

The term granuloma as first applied in pathology referred to a tumor of granulation tissue or "granuloma," using the term "oma" to signify the idea of a tumor formation, and since this inflammatory process is caused by an organism, it falls under the group of infective granulomata. The term granuloma inguinale tropicum is a misnomer as the disease is not essentially a tropical one; nor are the lesions limited to the inguinal regions; likewise granuloma venereum is misleading as it cannot be classified as a true venereal disease in the sense of gonorrhœa, chancroids, etc. Groin ulceration or ulcerative granuloma does not describe the true pathology of this morbid process. The pathological picture is that of a hyperplasia of the epithelial structures and connective-tissue elements with the formation of dense sclerosed bands of connective tissue rather than an ulcerative or degenerative process.

The term "chronic infectious granulomata" seems to be a better term to employ, but until the true etiology is definitely settled, there is no logical reason for additional nomenclature of this morbid process.

Granuloma inguinale is a mildly contagious infection of disputed etiology, characterized anatomically by a replacement fibrosis with secondary sclerosis and associated ulceration of the overlying tissues, a diffuse perivascular round cell infiltration, and the formation of granulomata without caseation or giant cell formation. Clinically, the lesions are limited to the genital organs and marked by its chronicity and tendency of recurrence.

HISTORY AND GEOGRAPHICAL DISTRIBUTION

Serpiginous ulceration or granuloma inguinale was first described by Surgeon Major McLeod (27) in India in 1882. The disease

[1] Read before the Chicago Gynecological Society, December 21, 1923.

AN ANALYSIS OF CASES OF GRANULOMA INGUINALE REPORTED IN THE UNITED STATES

Reporter	Age	Sex	Race	Region Involved	Duration	Wassermann	Place Observed	Probable Origin	Treatment and Results
Grindon	60	M.	Negro	Penis	10 yrs.	.....	St. Louis	Louisiana	Not given.
	37	M.	Negro	Groin	.....	.....	St. Louis	Louisiana	Not given.
	42	M.	Negro	Groin	.....	.....	St. Louis	Louisiana	Not given.
Symmers and Frost	29	M.	Negro	Inguinal (rt.)	2 yrs.	Negative	New York City	Georgia	Tartar emetic, died
	26	M.	Negro	Penis	5 yrs.	Negative	New York City	Pennsylvania	.....
Walker	..	M.	Negro	Rt. groin	1 yr.	.....	San Francisco	Brazil	Tartar emetic, partly healed.
Campbell	28	M.	Negro	Penis	4 mos.	1 plus	New York City	Georgia	Tartar emetic, cured.
	27	M.	Negro	Lower abdomen	3 mos.	.....	New York City	Georgia	Improved.
	32	M.	Negro	Scrotum, penis	.....	.....	New York City	Georgia	.....
Goodman	..	F.	Negro	Groin	.....	.....	New York City	.....	.....
	..	F.	Negro	Clitoris	.....	.....	New York City	.....	.....
	..	M.	Negro	Penis	.....	.....	New York City	.....	.....
	32	M.	White	Groin, pubis	.....	.....	New York City	.....	.....
Claassen	40	F.	White	Groin	11 yrs.	4 plus	Cincinnati	.....	No treatment.
	32	M.	Negro	Hand, penis	3 yrs.	Negative	Cincinnati	Ohio	Emetic, healed.
	24	F.	Negro	Vulva	3 yrs.	Negative	Cincinnati	.....	Deserted.
	34	F.	White	Vulva	4 yrs.	Negative	Cincinnati	.....	.....
Winfield	18	F.	White	Labia minora	1 mo.	Negative	New York City	S. America	.....
	29	M.	Negro	Scrotum	1 yr.	(?)Negative	New York City	.....	.....
Weinberg	28	F.	Negro	Labia minora	1 yr.	4 plus	Sumter, So. C.	So. Carolina	Emetic, no results.
	40	M.	Negro	Groin, scrotum	4 yrs.	Negative	Sumter, So. C.	So. Carolina	.....
	25	M.	Negro	Penis	4 yrs.	.....	Sumter, So. C.	So. Carolina	.....
Reed and Wolf	27	F.	Negro	Vagina, thighs	2 yrs.	Negative	New Orleans	Louisiana	Emetic, healed.
	26	F.	Negro	Vulva, groins	17 mos.	Positive	New Orleans	Louisiana	Emetic, healed.
	25	F.	Negro	Vagina, groin	3 yrs.	.....	New Orleans	Louisiana	Emetic.
	29	M.	Negro	Penis	7 yrs.	Negative	New Orleans	Miss. or Mex.	Emetic.
	21	F.	Negro	.....	1 yr.	Negative	New Orleans	Louisiana	Emetic, improved.
Shattuck	32	M.	Negro	Groin	5 yrs.	Positive	Boston	So. Carolina	Tartar emetic.
Ross	50	M.	Negro	Penis	4 mos.	Negative	Richmond	Virginia	Emetic, improved.
	34	M.	Negro	Groin	12 yrs.	Negative	.....	Virginia	Emetic.
	40	M.	Negro	Groin	.....	.....	.....	Virginia	Emetic.
	30	M.	Negro	Pubis	10 yrs.	Negative	.....	Virginia	Emetic, healed.
	21	M.	Negro	Penis	.....	Negative	.....	Virginia	Emetic.
	46	M.	Negro	Penis	.....	.....	.....	Virginia	Emetic.
	28	F.	Negro	.....	10 yrs.	Negative	New Orleans	Virginia	Emetic, healed in 4 weeks.
Gage	30	M.	Negro	Abd. thigh (arms)	5 yrs.	Negative	New Orleans	(?)	Emetic, no effect.
	30	M.	Negro	Penis	.....	Negative	New Orleans	Louisiana	Emetic, healed.
	25	F.	Negro	Vulva	.....	Negative	New Orleans	Louisiana	Emetic, improved.
	42	F.	Negro	Vulva	5 mos.	Negative	New Orleans	Louisiana	Emetic, improved, deserted.
Morrisey	52	M.	Negro	Groin, penis	1 yr.	.....	.....	Tennessee	Emetic, improved.
Randall, Small, and Belk	30	F.	Negro	Groin, perineum	8 mos.	.....	Philadelphia	Philadelphia	Healed.
	21	F.	Negro	Labia majora	9 yrs.	.....	Philadelphia	Philadelphia	Healed.
	37	M.	Negro	Groin	2 yrs.	.....	Philadelphia	Philadelphia	Healed.
	..	F.	Negro	Groin	3 yrs.	.....	Tropics	Philadelphia	Healed, recurr.
	23	M.	Negro	Groin	2 yrs.	.....	Virginia	Philadelphia	Partly healed.
	55	M.	Negro	Arms	2 mos.	.....	Maryland	Philadelphia	Partly healed.
	43	M.	Negro	Penis	4 yrs.	.....	Pennsylvania	Philadelphia	Partly healed.
	39	M.	Negro	Groin	2 yrs.	.....	Philadelphia	Philadelphia	Doubtful.
	26	M.	Negro	Groin, penis	1 yr.	.....	Philadelphia	Philadelphia	Partly healed.
	20	F.	Negro	Labia majora	.....	.....	.....	Philadelphia	Healed.
	25	M.	Negro	Groin	4 yrs.	.....	New Jersey	Philadelphia	Partly healed.
	32	M.	Negro	Penis	1 yr.	.....	.....	Philadelphia	Partly healed.
	..	F.	Negro	Labia majora	9 mos.	.....	.....	Philadelphia	Healed.
	25	M.	White	Penis	3 yrs.	.....	.....	Philadelphia	Healed.
	20	F.	Negro	.....	2 yrs.	.....	.....	Philadelphia	Doubtful case.
	43	M.	Negro	.....	17 yrs.	.....	.....	Philadelphia	Partly healed.
Lynch	Reports 9 cases.								
Smith	28	M.	Negro	Inguinal (rt.)	.....	.....	Atlanta	Georgia	Partly healed.
	23	F.	Negro	Labia majora	2 mos.	.....	Atlanta	Georgia	Marked improvement.
	17	F.	Negro	Labia majora	.....	.....	Atlanta	Georgia	Deserted.

Fig. 1. Distribution of cases reported in the United States.

was first designated and defined as a distinct clinical entity in British Guiana in 1896 by Conyers and Daniels (8) among the native negroes, but was believed to be a tuberculous groin ulceration. In 1897, Galloway (13) added observations and called the condition ulcerative granuloma of the pudenda. Since that time cases have been reported in Brazil (1), West Indies (14), West Africa (43), South China, Australia (41), India (5), New Guinea (30), Central America (36), South Sea Islands, and in many sections of the United States.

While it is more common in the torrid zone, yet in certain tropical countries it is not present. In the West Indian Islands (34) it does not occur and is rare in the Malay Peninsula and in Central Africa. It is stated by Poch that it is so prevalent in British New Guinea that special hospitals have been erected for these cases.

In the United States cases have been reported in New York (3, 4, 45), Philadelphia (31), Cincinnati (6), Charleston (22), Sumter (44), Boston (37), New Orleans (12, 33), Atlanta (40), Nashville (28, 20), Richmond (10, 35), San Francisco (43), and in many Southern States. During the past 3 years over 66 cases were reported as shown on the map (Fig. 1).

This is of great significance to our country because once a source of infection has reached a community, numerous cases soon appear especially as there is a predilection for the colored race.

ETIOLOGY

Since the disease was first described by Conyers and Daniels (8) in 1896 as a distinct clinical entity, many etiological causes have been described. These authors believed it to be a lupoid form of ulceration. Le Dantic (19) considered the process tuberculous, and claimed to have produced tuberculosis in animals from granulome inguinale. In 1904 Donovan (9) described certain inclusions in

Fig. 2. Shows extensive ulceration of labia majora with extension into vagina. Œdema of labia majora.

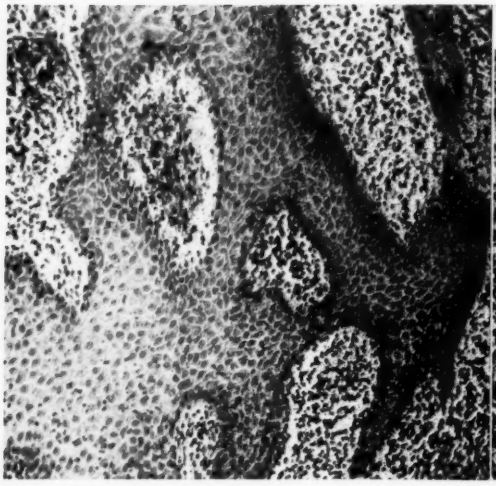

Fig. 3. Section near edge of ulcer, showing marked round cell infiltration and sclerosis. Many of the mononuclear cells contain Donovan bodies.

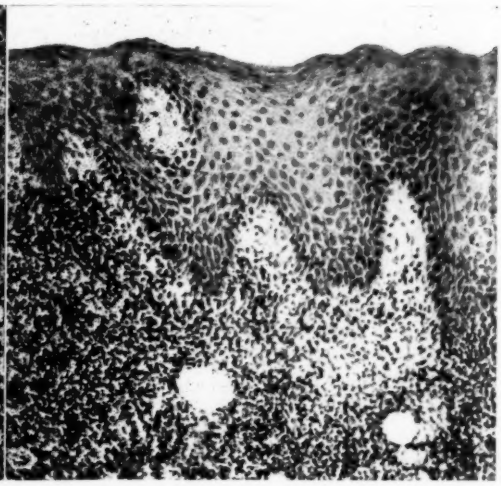

Fig. 4. Section of chronic inflammation. Granulation tissue. Confused with malignancy because of the downgrowth of epithelium.

the mononuclear cells found in the lesions. Most observers agree on the constancy with which this micro-organism is to be demonstrated in the lesions, and the tendency is to accord it an important rôle in the production of the disease. Donovan believed the germ to be a protozoan; Siebert (38) identified the intracellular organisms as encapsulated diplococci and Martini (26) succeeded in cultivating the organism from the lesions.

Wise (46), Maitland (24), and MacLennon (23) and other observers have found spirochætæ of the treponema type, and believe it to be a manifestation of syphilis. Although the spirochætæ that may be present in the lesions of certain cases disappear under salvarsan treatment, the ulcerations are not affected by this treatment. This has been confirmed by Cleland and Hukinbothan (7) in cases of granuloma in Australia. Plehn (29) considers the lesion a syphilitic process and sees no reason for separating granuloma inguinale from the phagodenic chancres of extragenital regions.

However, Flu (11) in a very careful study of granuloma venereum thinks that the reaction of the infected cells is suggestive of a chlamydozoa, while Carter (5), in his study of granuloma, looked upon these inclusions as gregarine type of crithidia or herpetomonads. Flu also suggested that this intracellular gram negative organism might belong to the capsulated bacilli. However, in his two series of experiments, the bacilli were not identical, and in consequence of these diverse results Flu states that he considers his cultivation experiments doubtful.

Aragão and Vianna (1, 2) found the intracellular organism constantly present in cases of granuloma inguinale in Brazil; and these authors obtained on Sabourand's media pure cultures of an organism having the same morphological characteristics as those observed in the lesions. These authors consider the organism to be a schizomycete, but to constitute a new germ which they designate as kalymmato bacterium and named the specific organism kalymmato granulomatis. In animal experiments they found this organism to be pathogenic in kittens, guinea pigs, and rats. Walker (43) considers these inclusions as bacilli that belong to the mucosus group. Randall, Small, and Belk (31) also place these inclusions in mucosis group. In a later communication Small and Julianelli (39), in a very careful study on the biological and serological aspect of the bacillus mucosus group, were not able to differentiate these from strains of the mucosus group of the respiratory

tract except that the bacilli of granuloma were more resistant to growth inhibition effect of tartar emetic than the respiratory group.

From these diverse opinions it seems doubtful if the true etiological factor of granuloma has been described. Symmers and Frost state: "The evidence that they (inclusion bodies) have a direct causative relationship to granuloma inguinale however, appears not to have been definitely established."

Season. The disease is not apparently influenced by the season of the year, although more cases are observed during the autumn and winter months. This is probably due to economic conditions as dispensary and charitable institutions are more crowded at this period of the year.

Sex. While granuloma inguinale may be classified as a venereal disease, for example is acquired by sexual connections, it has nothing to do with syphilis, or the other usual venereal diseases. Therefore males and females should be equally liable to the affection, but Galloway (13) reports a greater number among females in the tropics.

Of the 66 cases reported in this country, it was found almost three times more frequently in the male.

	Males	Females
Cases	45	21
Average age	35	26
Duration, average number of years	3.1	3.2

Age. Granuloma inguinale has never been observed before puberty. The greatest susceptibility is between the age of 20 and 35. Of the 66 cases recorded there were under 22 years of age, 2; between 20 and 30, 15; between 30 and 40, 13; between 40 and 50, 4; above 50, 3; age not given, 27.

Race. Granuloma inguinale has a predilection for the negro race or those of negro descent. Only three or four cases have been recorded in the white race (31, 14, 4).

Immunity. There appears to be very little or no immunity toward granuloma except for a slight racial immunity in the white race. One attack does not protect the individual, and recurrences are not infrequent. However, as we are still in the dark as to the true etiology of granuloma, and sufficient time has not elapsed with the present method of treatment (tartar emetic), no definite conclusions can be made at the present time.

Incubation. The periods of incubation have been variously stated as 2 days (Low's, 21), 8 days (Maitland, 24), 1 month (Hoffman, 17), and 3 months after sexual contact (Reed and Wolf, 33).

Distribution in body. The lesions are more numerous and constant about the genital organs and anus. In the male it appears to be more common at the base of the penis and in the inguinal folds. In the female the labia majora is more frequently attacked, and may extend up the vagina, but never invades the cervix. Maitland (24) and Beeson (3) report one case with lesions in the buccal cavity and tongue. An associated gangrene of the fallopian tube (22) has been noted in two cases without a reasonable explanation. Whether this is a mere coincidence or a sequelæ of the morbid process has not been determined.

Modes of conveyance. The lesions appear to follow sexual contact, although auto-inoculation in scarified areas (Walker, 43) and intradermal and subcutaneous auto-injections (Schochet) gave negative results. It does not appear to be highly contagious as it may occur in husband or wife alone.

If the lesions are produced by a protozoan body, it is suggested that studies be made with body and pubic lice, and other parasites as intermediate hosts. All cases thus reported have been as a result of direct sexual contact.

PATHOLOGY

Gross morbid anatomy. The changes that occur may be conveniently described in three stages. The typical primary lesion is a papule or small nodule, which according to Manson, commences in the majority of cases as an insignificant, circumscribed, nodular thickening and elevation of the skin. The affected area is covered with a delicate, pinkish epithelium, which is easily rubbed off, excoriates readily, exposing a surface prone to bleed and break down. Caseation of the nodules never occurs.

Secondary stage or ulcerative stage. The lesions of this stage are vivid in hue, and ap-

pear as ulcerated masses of granulation tissue, "surrounded by a serpiginous irregular border of nodular, somewhat raised, red, glazed delicately skinned or pinkish superficially ulcerating or cracked new-growth" (Manson, 25). The lesion is painless, bleeds easily, and at times may be the seat of intense itching.

Third stage. In this stage the lesions appear very much like other healing ulcers. The edges present a blush white hue of epithelization. The granulations are irregular but firm. The surface may be covered by a thin, watery secretion. In other areas the healed cicatrized parts may regress with a breaking down of the thin, shining epithelium and the formation of new granulation tissue. Œdema of the parts are not uncommon.

HISTOPATHOLOGY

The epithelium is absent over the ulcerated areas. Near the edges the epithelium is thickened and interpapillary processes are much elongated. The various epithelial layers are poorly defined. The regular columnar arrangement of the basal layer of the epithelium is lost, while there is either no pigment or irregular deposits in the subcutaneous tissues. Round cells are arranged in masses in the upper layers. Degenerate cells are rare, and there is no evidence of caseation or breaking down of any part of the growth. In some areas, the blood vessels are dilated and congested, while in other areas, there are numerous large and small capillaries with angioblastic loops. These are not congested. Gage (12) believes that the dense and diffuse round-cell infiltration in the corium is the most characteristic feature of the lesions. Near the surface of the ulcer polymorphonuclears are numerous and may be found between the epithelial cells. The connective tissue consists of swelling or hydropic degeneration of the white and yellow elastic fibers which is replaced by new connective tissue, which is straighter (fibers) and more compact. This abundant formation of new connective tissue constitutes the essential feature of the cutaneous lesion of granuloma inguinale. "Sclerosing" has been suggested and would be a better term than "ulcerating" as the ulceration seems to be accidental while the formation of dense fibrous tissue and deep scarring is invariable.

DIAGNOSIS

The diagnosis is made on the finding of the Donovan bodies. The intracellular inclusions are easily demonstrated in the secretions obtained in the deeper parts of the granulation tissue and stained with Wright's stain or Giemsa's method—a modification of Romanowsky's method.

CLINICAL FORMS

We may recognize two groups: (a) the ordinary ulcerative lesion, with its typical granulation tissue as described under gross morbid process; (b) the spurious elephantiasis with typical areas of granuloma. While the lymphatic glands are not enlarged, nor does suppuration take place even with extensive ulcerations, there is, however, obstruction to the lymphatic flow to produce this elephantoid type.

SYMPTOMS

The symptoms are purely local. The extensive ulceration with sclerosed granulation tissue is as a rule painless, although intense itching or a burning sensation may be present at times. Except for the sero-aqueous discharge the patient does not seem to be affected by the morbid process. A mild secondary anæmia was observed in the author's case. No systemic lesions are present.

DIFFERENTIAL DIAGNOSIS

Granuloma inguinale has been confused with tuberculosis, syphilis, epithelioma, and yaws. It can readily be differentiated from epithelioma by the examination of small pieces of excised tissue; from lupus vulgaris it differs inasmuch as it is confined practically to the pudendal region, affects mucous as well as cutaneous surfaces, tends to follow in its extension in the linear folds of the skin, and is not associated with the tubercle bacilli, giant cells, caseation, or other evidences of tuberculous disease; from syphilis and yaws by the negative Wassermann, and the absence of glandular involvement and by nonamenability to mercury and iodide of potassium.

COMPLICATIONS

It should be emphasized that there is no general adenopathy. In spite of the extensive ulcerations that may be present, especially in the neglected cases that have extended over a period of years, suppurative adenitis seldom occurs. In one case reported by Lynch, acute gangrene of the fallopian tube was found, the cause of which was not determined. In another case gangrene of the feet was observed. This condition improved rapidly under treatment with tartar emetic. A sufficient number of cases have not been reported to warrant a definite statement in reference to this complication. A mild secondary anæmia is not uncommon. Spurious elephantiasis of the vulva, penis, or scrotum is common without any evidence of filarial elephantiasis. This was true in Dr. W. E. Persons' patient, who had an associated bilateral hernia. The true nature of the lesion was not recognized at the time the writer performed the necropsy. The marked œdema and excessive fibrosis was due to blocking of the lymphatic stream in some way not solved at present.

PROGNOSIS

With the intravenous use of antimony the local lesions rapidly disappear, but there is a tendency for recurrence or the development of new lesions in the scar, unless treatment is continued for some time with one of the antimony compounds. It must be borne in mind, however, that too prolonged use of antimony produces fatty degeneration of the liver, kidney, heart, and muscular tissue of the diaphragm (Prestley). It does not appear to affect the general health of the patient, although the lesions may exist for years. Antisyphilitic treatment is useless.

PROPHYLAXIS

The disease should be placed on the list of reportable infections and patients should be placed in hospital quarantine. Segregation should be compulsory as most of the unfortunate individuals belong to the lower strata of society and even with extensive lesions, sexual relations are indulged in. As these cases are rebellious to treatment and painful, it is not uncommon that many of these patients desert.

The health department of the city of Chicago does not require that this disease be reported (16).

TREATMENT

This disease is very intractable to treatment. X-ray, caustics, and the use of the actual cautery have been employed with partial success. Complete excision has been advocated in the past as the best means for permanent cure.

The use of antimony was first suggested by Mesnil and Nicolle (21) in the treatment of trypanosomasis but the credit is due to Aragão and Vianna for popularizing this method of treatment. However, it must be remembered that antimony compounds should not be used too freely. Deaths have been reported from the use of antimony, and the author has seen one death following the intravenous administration of this drug. Crevin (6) in 1568 wrote that there is no drug with which one might more secretly poison a man, and the students of Heidelberg were required at one time to take oath never to use it. According to Salkowiski and Prestley, the prolonged use produces fatty degeneration of the liver, kidney, heart, and muscular tissue of the diaphragm.

Lasbrey and Coleman (18) report ten deaths that could be attributed to antimony tartrate in a series of one thousand cases of bilharziasis treated with this drug.

Randall reports renal irritation following the administration of tartar emetic in two cases of his series. Pains in the long bones and shoulder girdle, rheumatoid in character, is considered physiological following the administration of 0.1 gram on alternate days. Yet antimony or one of its salts is the best drug at our command in the treatment of granuloma inguinale.

The tartrate of antimony is best given intravenously on alternating days with an initial dose of .05 or 0.1 gram with increasing doses to 0.9 gram. Shortly after the intravenous administration, the patient may complain of severe pains in the arm, especially if administered too rapidly. In other cases severe pressure pains in the chest may be encountered.

In a recent paper Randall (32) reports brilliant results with the intravenous injection of

sodium antimony thioglycholate and triamide of antimony thioglycholate prepared by Prof. John Abel, of Johns Hopkins University. No toxic effects and complete absence of symptoms were noted in these cases.

SUMMARY

1. Granuloma inguinale is becoming more common in the United States, and is no doubt masquerading under various diagnoses.

2. A careful study of all ulcerations about the genitals should be made for Donovan bodies, especially in those cases in which syphilis and tuberculosis have been eliminated.

3. Granuloma inguinale is never associated *per se* with general adenopathy.

4. Granuloma inguinale should be placed on the list of reportable diseases.

5. Antimony compounds are specific for granuloma inguinale.

CASE REPORT

History. The case here recorded occurred in a female patient, age 36, married, para II. There is nothing in her heredity of any importance as related to the present condition. Five years ago a small papule appeared on the labia majora which soon broke down with extensive ulceration. She received antiluetic treatment for a period of 2 years with negative results. Two years ago she was treated with intravenous injections of salvarsan for a period of 3 months without any effect on the lesion.

The case was first seen by the author in the Dispensary Service of Post Graduate Hospital on the service of Dr. Scott. No diagnosis was made except a Wassermann test was requested which was negative.

Examination. The patient was a well developed and nourished black female; height, 5 feet 6 inches; weight, 132 pounds. Eyes, ears and nose were negative. Marked pyorrhœa with several decayed teeth. Heart, chest and abdomen were negative. Vulva shows an extensive ulceration involving the whole of the right labia majora and extending up the vagina. The ulcerations were somewhat nodular, firm, and composed of dark purplish red granulation tissue. There was no general adenopathy.

Wassermann negative with cholesterinized and acetone insoluble antigens. Stained smears from the deeper portions of the granulation tissue shows many mononuclear cells containing Donovan or granuloma bodies.

Treatment. Injections of antimony showed rapid improvement. After three weeks treatment with antimony, the lesions that measured 10 by 2 centimeters are healed and covered with epithelium.

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CONGENITAL CYSTIC KIDNEY IN THE NEWBORN

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A REVIEW of the literature fails to reveal any satisfactory statistics regarding the incidence of congenital cystic kidney, but the opinion prevails that the disease is rare. There is certainly a large number of cases which are never reported. This fact along with the difficulties encountered in diagnosing this condition and the impossibility of performing routine autopsies probably accounts for the small number of cases recorded. When available statistics are collected we find that in 1914 Barnett (1) collected 251 authentic cases and that since then about 100 cases have been reported. It is obvious that, contrary to the usual idea, congenital cystic kidney is quite common. It is only because of the unusual features of our case that we are reporting it.

Baby M. C., born 5:10 p.m., died 6:40 p.m. The mother of this infant entered the obstetrical ward of the Cook County Hospital in labor which began about 6 hours before admission, and was delivered at once. She was 25 years old, colored, and gave a history of having a child 2½ years old, living and well, and of a spontaneous abortion at 2 months about 2 years ago. She further states that the present pregnancy has been normal and that there was "no escape of water" previous to admission. On examination a diagnosis of dry labor, cephalic presentation in the occipitolævo-anterior position was made. During the delivery large pieces of vernix caseosa were expelled. The child was normal except that the abdomen was distended and contained a palpable mass on the right side. The Wassermann reaction on the placental blood was negative. The respirations of the infant at birth were labored and all measures for stimulation failed to bring about any change in the poor condition of the infant and it died shortly after birth.

The postmortem diagnosis was as follows: congenital polycystic kidneys, partial congenital atelectasis of the lungs and subpleural emphysema. There were no cysts in any of the other organs and no other congenital defects. For the sake of brevity we will describe only the kidneys.

Grossly the left kidney measured 8 centimeters in length, 4 centimeters in width and 4.5 centimeters in thickness. There was no distinct pelvis visible and the ureter seemed to take origin between a mass of cysts and measured 1.5 millimeters across. The entire surface of the kidney was studded with cysts which varied in size from 2 millimeters to 4 centimeters in diameter. The cyst walls were tense, somewhat translucent and contained a straw colored fluid within them. On the surface of the cysts many fine blood vessels were seen distributed irregularly. From one to eight "daughter cysts" were present on the surface of many larger cysts. The fluid from the cysts was straw colored and the amount contained in each cyst varied from a drop to 10 cubic centimeters. Upon removal of the fluid the cyst walls collapsed. The capsule of the kidney was somewhat thickened and stripped with difficulty. In many places, but especially to the areas of fibrous tissue between the cysts, the capsule was firmly adherent. There was very little peri-renal fat present. The weight of the kidney was 70 grams. On cut section the entire substance of the kidney was seen to be replaced by cysts. Between the cysts there was a large amount of immature connective tissue which was very vascular. The inside of the cysts opened into each other. The cyst wall measured about ½ millimeter in thickness. The pelvis could not be found, but the ureter opened into a cyst at the site of the pelvis. The right kidney was essentially the same as the left (Fig. 1).

Microscopical examination of sections from various portions of each kidney were made. The cyst walls were seen to be formed by immature connective tissue and were lined with a single layer of cuboidal epithelium. There was a large amount of embryonic connective tissue interspersed between the cysts, the cells of which were numerous and contained many nuclei. This connective tissue was very vascular and the many vessels were dilated and engorged with red corpuscles. In several places small islets of embryonic kidney tissue in the form of underdeveloped glomeruli and tubules presented themselves. The glomeruli were made up of from two to four tufts. The cells in the tufts were increased in number and contained many nuclei. The Bowman's capsules were somewhat dilated and here also the cells contained several nuclei. The tubules were irregularly distributed, seemed somewhat dilated and the cells contained many nuclei. There was no systematic arrangement of tubules and glomeruli and between the islets of kidney tissue was a large amount of embryonic connective tissue. The kidney had reached a state of development seen in a 6 months fetus.

Chemical examination of the fluid in the cysts showed 45.96 milligram of urea, 1.66 milligrams of uric acid, 1.35 milligrams of creatinine, and 740 milligrams of chlorides per 100 cubic centimeters of fluid. The physical properties resembled those of

urine. The fluid was somewhat turbid, straw colored, contained albumin, and microscopically was seen to contain red blood cells, and epithelial cells.

Most of the interest in this disease centers about its etiology. In analyzing the reported cases arguments in favor of all the accepted theories can be found. There also appear two facts which seem to be important factors in deciding which is the most logical theory. These are the influence of heredity and the presence of other fetal anomalies. A number of cases appear in the literature in which several members of the same family have died of congenital cystic kidney. The cases of Wobus (2) and Bunting (3) are of interest in this respect. Moschcowitz (4) has emphasized the frequent association of other anomalies. He states that cysts of the liver occur in 19 per cent of the cases. Other congenital defects are present in about 25 per cent of the cases. As to the actual etiology there has been much theorizing. Virchow (5) was of the belief that the cysts were the result of the obstruction of the kidney tubules by uric acid infarcts. Later he modified this idea and concluded that the disease followed an inflammation of the papillæ from irritation by uric acid and lime salts and that the obliteration of the collecting tubules was followed by a cystic dilatation of Bowman's capsule. In 1880 Brigidi and Severi (6) brought forth the neoplastic theory and concluded that congenital cystic kidney was in every way a cystadenoma. The findings in our case do not seem to support either of the above theories, but point to some defect in development as the most probable cause. In view of the fact that this idea is by far the most widely accepted one, it is perhaps advisable to outline briefly the embryological development of the kidney. In a fetus of 5 weeks a diverticulum can be seen growing out from the dorsal mesial aspect of the wolffian duct immediately in front of its opening into the cloaca. This is later to become the kidney pelvis, and around it is seen an area of nephrogenetic tissue differentiated into an outer mesenchymatous and an inner epithelioid zone. The secreting tubules arise from the former and the collecting tubules from the

Fig. 1. Congenital cystic kidney one-half actual size.

latter. Failure of the collecting tubules to unite with those of the secreting type will obviously give rise to an anomaly productive of multiple cysts. Kampmeier (19) after a study of the embryological development of the human kidney finds that in fetal life there is normally a stage in the development of the kidneys in which there are numerous cystic tubules. He concludes from this that congenital renal cysts result when the tubules continue to grow to the detriment of adjacent normal structures. The kidney tissue examined in our case, showing arrested fetal development, all stages of dilatation of Bowman's capsule, and the irregular arrangement of the tubules, as well as the chemistry of the cystic fluid all indicate some defect in development as the most likely cause.

The age at which congenital cystic kidney is discovered is also of considerable interest. Briefly, the cases can be divided into two classes; those which are discovered just before or after birth and those which come to light in adult life. The majority of the cases fall into the latter group. Barnett (1) in an analysis of 251 cases found the average age to be 41½ years. In his series the ages ranged from 5 to 76 years. Ritchie (7) reported 88 cases with an average age of 45.3 years. The number of cases reported in infants and children is quite small, in fact one is lead to believe that the disease is rarely discovered

in infancy. The cases reported by Wobus (2), Green (8), Smith (9), Jepson (10), Bunting (3), Graves (11), Leopold (12), Royster (13), Greene (14), Fullerton (15), and Glasser (16) represent practically all the reported cases in infants. In this series the ages range from 11 days to 5 years and the average age is 16 months. Glasser in a thorough review of the literature up to the time of his report finds only twelve cases reported during the first year of life. We have been unable to find any record of a case occuring in a newborn infant which lived just 2 hours and believe our case is unusual in this respect.

It is not the purpose of this paper to enter into a discussion of the symptoms, diagnosis, and treatment of this disease. The rôle of congenital cystic kidney in the production of dystocia is common knowledge. Williams (17), De Lee (18), and the authors of most textbooks in obstetrics mention the occasional occurrence of congenital defects in the fetus as a cause of dystocia. It is interesting here to note that in our case there was no dystocia at all and no evidence of pathology except for the dry labor. In personal communication with several obstetricians we have been told that a dry labor should always lead one to suspect an anomaly of the urinary tract in the fetus.

SUMMARY

A dry labor was followed by the birth of a fetus which was normal except for the presence of congenital cystic kidneys.

The microscopical examination of the kidney tissue and the chemical examination of the cyst contents tend to corroborate the theory of defective development *in utero* as the cause of this disease.

The age of the infant, the absence of other anomalies, the fact that there was no dystocia, and the presence of urea, uric acid, creatinine, and chlorides in the cyst contents are added points of interest.

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A STUDY OF THE PRESSURE HOUR-GLASS OR CASCADE STOMACH

Its Natural and Experimental Production, with Case Reports[1]

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THE so-called "pressure hour-glass," "cascade," or "cup and spill" form of stomach has received but a small share of the consideration which is due to so important a condition. The general lack of a clear clinical and roentgenological conception of this affection frequently leads to erroneous interpretation and to needless surgery.

The name cascade by which it is better known has been applied to that gastric deformity in which the posterior wall of the pars cardiaca forms a definite pouch and becomes distended with mixture before any descends to the lower pole. The remainder of the stomach fills from the overflow of this pouch in waterfall fashion. It is from this manner of filling rather than from the deformity or its causative factors that it has been so styled.

In Webster's (1) recent review of the literature pertaining to this subject he offers the opinions of Stierlin, Assmann, Schlesinger, Carman, Barclay, and others, concerning the underlying cause of the cascade stomach; spasm with and without intrinsic lesion, adhesions, and pressure from various sources are suggested. One is impressed by the lack of unanimity as to the factors necessary for the production of this condition. The situation is well described in Webster's conclusion: "It is evident from this summary of cases up to the present that the whole subject of 'cascade' or 'cup and spill' stomach requires further observations before organic or spasmodic types can be clearly differentiated."

Normally, the entire posterior wall of the stomach lies in an oblique plane, the cardiac portion being situated posteriorly while the lower pole more closely approximates the anterior abdominal wall. The inclination of this plane varies as does the habitus of the individual, the obliquity tending more to the horizontal in the hypersthenic type In the cascade stomach the posterior walls of the pars cardiaca and of the pars media are in different planes, that of the latter being anterior. In other words, the major part of the vertical arm is displaced forward, thereby producing an incomplete division of the pars media from the fundus.

It can be readily seen then, that the condition thus produced may vary from a simple "shelving" of the posterior wall, pars cardiaca, to definite locule formation. Realizing this variation we have endeavored to classify such cases according to degree, viz.: first degree, simple cardiac shelving in which the fundus fills first but practically none of the mixture is retained in this region for any appreciable time; second degree, 1 to 4 ounces (approximately) is retained in the upper portion before overflow occurs; third degree, the capacity of the upper locule is more than 4 ounces. It is in the last class that residue at the 6 hour period is noted in the cardiac locule, while none remains elsewhere in the stomach. Because of the pressure about the lower sac, evacuation of its contents is usually rapid.

The deformity of the cascade or pressure hour-glass stomach results from forward displacement of the more mobile portion of the vertical arm by pressure exerted along the posterior wall. This pressure is more commonly caused by a distended splenic flexure, less often by new-growth, particularly of

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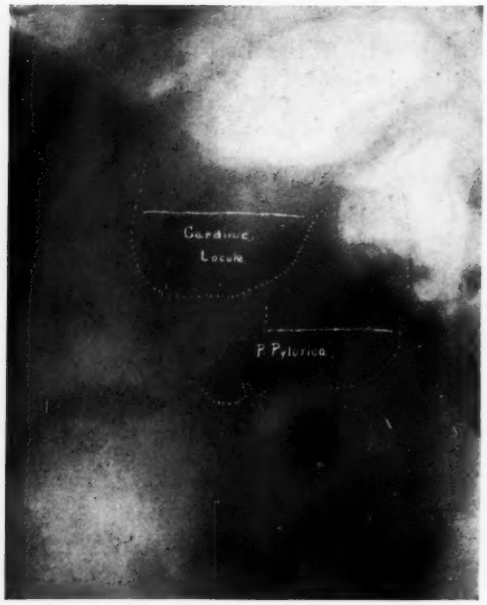

Fig. 1. Case 1. Pressure hour-glass stomach, third degree, in patient with extensive carcinoma of œsophagus. Position, right anterior oblique vertical after administration of sediment mixture; note large locule of pars cardiaca with its fluid level and second locule of pars media and pylorica also presenting a definite fluid level.

Fig. 2. Case 1. Same condition as Figure 1, demonstrating the appearance of such deformity in the postero-anterior vertical posture; note the relation of locules, the lower being more mesially placed.

Fig. 3. Case 1. Same position as Figure 2. Stomach now well filled—condition not as striking; lower border of upper locule (accentuated by dotted line) superimposes the pars media.

retroperitoneal origin. Anatomists mention the relationship of the splenic flexure to the posterior wall of the stomach; this is corroborated roentgenologically in individuals of the sthenic and hypersthenic types, but in the hyposthenic and asthenic patients the splenic flexure is usually found to the outer side of the greater curvature. Consequently, distention of the splenic flexure of those of broad habitus may give rise to the deformity of the stomach as described.

The cascade form of stomach has been observed, in our work, only in association with a distended splenic flexure or a retrogastric mass. Spasm and adhesions have been offered as causes of the cascade stomach but on analysis of the deformity it becomes difficult to support this contention. A simple incisura (of intrinsic or extrinsic origin) at the junction of the partes cardiaca and media should cause no greater deformity than a spastic indrawing elsewhere in the stomach. The latter serves only to produce a bilocular

Fig. 4. Case 1. Conditions as in Figure 3. Position, left anterior oblique vertical—bilocular appearance still present but not as marked as before filling the stomach.

Fig. 5. Case 2. Pressure hour-glass stomach, third degree—caused by a large retroperitoneal sarcoma (autopsy). Position, right anterior oblique vertical. After administration of large quantity of mixture. Note the extremely large upper locule of the pars cardia and the relatively small size of the partes media and pylorica and the forward displacement of the latter.

stomach without disturbance of the antero-posterior relation of these locules, while in the pressure hour-glass stomach the pars media comprising the major part of the lower locule is displaced forward. Furthermore, antispasmodics have been administered without altering the condition.

Adhesions of the greater or lesser curvatures tend to displace the stomach to one or the other side, while those confined to the anterior surface draw that segment forward but do not disturb the plane of the posterior wall. Fixation of the posterior surface would tend to retract this wall backward, but the reverse of this is true for the cascade type. The only adhesion capable of producing a deformity similar to that of the cascade stomach would be one of the posterior wall encircling the stomach and being fixed anteriorly, but with this there might be expected a constriction of the lesser and greater curvatures which is not found in the type under discussion. Adhesions of the posterior wall, however, may be present with this condition, very likely the result of continued

Fig. 6. Same patient as in Figure 5. Position, postero-anterior vertical. Note relative size of upper and lower locules of pars cardia; lower border of upper locule which lies behind the pars media is accentuated by dotted line.

Fig. 7. Case 3. Normal stomach in postero-anterior vertical position.

Fig. 8. Case 3. Normal stomach in right anterior oblique horizontal posture.

irritation of the splenic flexure against this surface of the stomach.

An organic lesion of the alimentary tract is occassionally discovered concomitant with a cascade stomach and some consider that a definite relationship exists between the conditions. Such findings, however, are exceptional and offer no proof that the cascade deformity was the result of the accompanying lesion.

Figures 1 to 4 demonstrate the pressure hour glass stomach of an elderly man suffering from carcinoma of the œsophagus, but no relation between these conditions can be suggested. It is assumed that this case is representative of the group in which the gastric deformity is coincidental and has no direct association with the existing organic lesion. Gastrostomy was later performed on this patient at another institution, and the surgeon's notes record no abnormality of the stomach.

The deformity, as described, is more striking when only a small amount of the mixture is administered (Figs. 1 and 2), and is best visualized, fluoroscopically, during ingestion in the vertical anterior oblique postures. The deformity of the third degree case is often so marked that it may be misinterpreted as a true hour-glass stomach consequent to an organic lesion, as gastric ulcer; when the cardiac saccule is deep, it is sometimes mistaken for a diverticulum. If a correct diagnosis has not been reached by complete study, the somewhat perplexing radiographic findings in conjunction with the persistence of symptoms leads the patient to unnecessary operation.

Filling the stomach to capacity tends to overcome the pressure exerted by the distended splenic flexure and consequently toward obliteration of the deformity (compare Figs. 1 and 4). This, however, does not hold true for the cascade type produced by new-growth, since such retrogastric pressure cannot be overcome in this manner (Figs. 5 and 6).

As an aid toward differentiation of organic from pressure hour-glass stomach, the following features are important:

Fig. 9. Case 3. Pressure hour-glass stomach experimentally produced by colon inflation. Left anterior oblique posture. Note similarity of Figure 4 which represents a natural pressure hour-glass in the same position; note the definite locule formation which, however, is not as marked as before filling of the stomach.

Fig. 10. Case 3. Same condition as in Figure 9—in right anterior oblique vertical position. The lower border of the upper locule is below the level of the lesser curvature, pars pylorica.

Organic Hour-Glass Stomach	*Pressure Hour-Glass Stomach*
Constriction of one or more borders; if but one, it consists of an indrawing of the greater curvature.	Constriction of posterior wall only.
Constriction usually present in pars media.	Constriction present only near junction of the partes cardia and media.
No disturbance of the anteroposterior relation of locules.	Lower locule displaced forward.
No disturbance of the lateral relation of locules, except occasionally by adhesions.	Lower locule usually displaced mesially.
Irregularity of gastric contour.	Gastric contour regular.
Organic lesion present.	Organic lesion rarely present.
Appearance more pronounced on administration of large quantities of mixture.	Appearance much less marked on distention of stomach.
Condition persists.	Condition non-persistent. Minor degree of deformity may be absent on re-examination.

Associated with the pressure hour-glass stomach there occurs a pathognomonic group of symptoms, perhaps more characteristic than those of any other abnormality of the gastro-intestinal tract. A sense of distress referred to, by some, as pressure, by others as distention is complained of in the left hypochondrium, laterally and posteriorly; the sensation is continuous for periods, aggravated by constipation, and relieved by expulsion of flatus or evacuation of the colonic contents. This symptom results from the distention of the splenic flexure. After meals eructations and regurgitation of food are common; cardiac palpitation sometimes occurs. The post cibum distress may be less after a large, rather than a small, meal. This discomfort is due to the distention of the cardiac locule by food retention and gas accumulation; it might be obviated by the ingestion of large quantities at a time since the saccule formation is reduced by increasing the gastric content. Relief from the disturbances experienced after eating is obtained by means of various original methods; viz., massage of abdomen, moving about during meal, partaking of food while standing and by assuming a prone posi-

Fig. 11. Case 4. Gastro-intestinal tract of the writer after inflation of the colon with air—note the relation of the splenic flexure to the outer side of the stomach in one of hyposthenic tendency.

Fig. 12. Case 4. Same conditions as in Figure 11. Right anterior oblique position. Demonstrating that no deformity of the stomach is produced on account of splenic flexure relation to the outer side of stomach rather than behind same.

tion. From a radiographic viewpoint the last should serve most efficiently, since it permits the cardiac locule to empty readily.

The following case histories typify those obtained from patients suffering from a distended splenic flexure with resultant pressure hour glass stomach. The description of the complaint is frequently so characteristic that the diagnosis can be offered before radiographic examination is made.

CASE 1. Male, age 47; occupation, silversmith. Duration of symptoms, 6 months. Chief complaint: continuous sense of distention referred to back and lateral aspects of left hypochondrium. Eructations and regurgitation of food after meals; no vomiting; relieved by prone position. Palpitation, bowels move each day; no blood; no jaundice.

CASE 2. Male, age 33; occupation, fireman. Referred with clinical diagnosis of gastritis. Duration of symptoms, 6 years. Chief complaint: distress in left upper quadrant referred to side and back of this region; distress is constant, aggravated by constipation. "Feels bloated after meals." Eructations and regurgitation of food after eating; no vomiting; no jaundice; bowels constipated, move each day with medication.

On fluoroscopic examination both of these patients presented the typical cascade stomach caused by pressure from the gas distended splenic flexure. No other abnormality of the gastro-intestinal tract was discovered in either case. The deformity was much less marked on filling the stomach to capacity, thereby again demonstrating the necessity of examination with a relatively small amount of liquid, preferably a sediment mixture.

The deformity is not always persistent, as patients presenting this picture may have a stomach normal in every respect on re-examination at a later date, if during the interim the distention of the splenic flexure has been relieved.

Experimental production of pressure hour-glass stomach in hypersthenic individual. In an endeavor to corroborate the view that a cascade stomach is the result of pressure, the alimentary tract of a patient of hypersthenic habitus was examined completely by routine

Fig. 13. Case 4. Same conditions as Figure 12. Left anterior oblique position; slight indenture only of greater curvature aspect of pars media by the distended ascending arm of the splenic flexure.

Fig. 14. Case 5. Before operation—naturally produced pressure hour glass stomach, third degree. Left anterior oblique vertical; demonstrating definite locule formation of the pars cardiaca in which portion, only, retention at 6 hour period was present. Note relation of locules and also gaseous distention of splenic flexure.

fluoroscopic and radiographic methods and no evidence of any abnormality was noted. The stomach was of normal size, shape, position, and contour (Fig. 7); in the oblique views the posterior wall was found to be of definitely regular outline and lying in a plane of moderate obliquity (Fig. 8).

Proof that a given factor is a cause of a known condition is to produce the condition by it; consequently, it was decided to distend the splenic flexure of this patient who had been found to possess a stomach radiographically normal in all respects. After complete evacuation of the first meal, a rectal tube was inserted and the colon inflated with air until the splenic flexure was well distended. The patient was then placed in the right anterior oblique vertical position and fluoroscopic observations made during the ingestion of the opaque liquid. On reaching the cardia the mixture did not immediately descend to the lower pole as in the routine examination, but collected in a sac-like formation of the posterior wall, pars cardiaca, until this locule filled, then overflow occurred into the lower pole in true cascade fashion. When the pars media had been filled it could be noted that this portion had been displaced forward and upward by the inflated splenic flexure (Figs. 9 and 10), thus producing experimentally, a typical "pressure hour-glass stomach" in a patient found previously to possess a normal gastro-intestinal tract.

Experiment with hyposthenic type. In an attempt to demonstrate the stomach colon relation in the individual of hyposthenic tendencies and further to experience symptoms thus produced, the writer's (R. A. R.) colon was inflated with air and an opaque meal ingested. Fluoroscopic examination was made during the administration of the mixture and no abnormality of position of the stomach or unusual relation of its divisions was noted. It was, therefore, demonstrated by this procedure that a cascade type was not produced

Fig. 15. Case 5. Before operation—same position as Figure 14. After filling stomach; locule formation much less marked. Note angle of anterior wall at junction of partes cardia and media due to distention and no doubt corresponding to the site of herniation.

Fig. 16. Case 5. After operation. Postero-anterior vertical. No deformity of the stomach noted in this or either oblique view.

because of the position of the splenic flexure to the left of the stomach rather than behind it as in the hypersthenic patient and further the entire left half of transverse colon was found to be in relation to the greater curvature of the stomach (Figs. 11 to 13). The symptoms witnessed consisted of a general abdominal distention, with slight nausea and a desire to eructate; the gastric symptoms no doubt would have been more marked had the pressure of the splenic flexure been directed against the stomach as in the cascade type.

A most interesting and instructive case in conjunction with the discussion of pressure hour-glass stomach is that which occurred in the service of Dr. John F. Connors (2) at Harlem Hospital, to whom I am indeed much indebted for the opportunity accorded me to examine this patient after her operation. Appreciation is also expressed to Dr. William Robinson, roentgenologist to Harlem Hospital for his co-operation.

"Patient (service of Dr. Connors), adult, female, admitted to Harlem Hospital, August 16, 1922, with diagnosis of appendicitis. Chief complaint: distress after meals. Family history, negative. Previous history, indigestion for past 5 years, otherwise irrelevant.

Present history. Day before admission, patient began to feel sick complaining of headaches, nausea, and cramplike pains through abdomen. Upon questioning, the full history is elicited. Immediately after a few mouthfuls of food there is a fulness in the left upper quadrant of abdomen. Patient says that she is able to relieve this by massage and moving about. Lately she has been taking her meals standing. With this distress there are frequent gaseous eructations and sour tastes, but there is no vomiting. This distress is always in the same area, that is in the left upper quadrant, in which constant tenderness is present. She has no hunger pain. Of late she has discontinued using sour liquids and starchy foods because of the great distress which follows.

"Gastro-intestinal roentgen examination ordered and revealed: Six hour examination shows a retention in a pouch-like formation of the lesser curvature, pars cardia, just opposite the epicardial portion of the œsophagus; no other gastric retention. As 2 more tablespoonsful of barium mixture are given, this does not fill the pars pylorica as usual but fills

Fig. 17. Case 5. After operation. Incomplete artificial distention of the splenic flexure. Left anterior oblique vertical. Note the tendency to locule formation of the pars cardia and the forward displacement of the pars media.

Fig. 18. Case 5. After operation. Examination following second and more complete artificial distention of the colon. Right anterior oblique vertical. Note definite locule formation with opaque level in each. Also note relation of hepatic flexure to greater curvature, pars pylorica. Note similarity to Figure 1, which represents a naturally produced deformity in the same posture.

this pouch first; as more of the opaque mixture is given the last overflows the pouch and passes into the pars pylorica (Figs. 14 and 15). The pouch formation which appears like a diverticulum is persistent on three different examinations; the last examination having been made after the administration of tincture of belladonna (as antispasmodic) for 5 days, 15 drops three times a day."

Dr. Connors reports that at operation an incomplete herniation of the anterior wall of the stomach through the gastrosplenic omentum was found. Judging from the roentgenograph (Fig. 15), such condition was undoubtedly the result of the prolonged distention of the cardiac locule. Further the operative report states: "There were no adhesions, induration, or other evidence of inflammation. The stomach walls were quite normal save for apparent slightly thinner wall in the region of the herniated portion as from repeated stretching."

After operation and while the patient was still in the hospital a second radiographic examination was made which disclosed a normal gastric motility, there being no retention in any part of the stomach at the 6 hour interval and further, this organ now assumed a normal position, characteristic of her type(Fig. 16). The patient at this time was symptom free.

Experiment No. 3. Reproduction of cascade stomach. Feeling assured that the anteoperative condition could be reproduced we asked to be allowed to study the patient after air injection of the colon as described in previous cases. Unfortunately, sufficient air could not be injected at this time because of defective apparatus; enough, however, was injected to demonstrate definitely the condition before operation, but to a less marked degree (Fig. 17).

At a later date the procedure was repeated; the colon was well distended with air and the usual opaque mixture given by mouth. The result was a definite loculation of the pars cardiaca in which a large quantity of the ingesta collected before spilling over into the lower pole occurred (Fig. 18). The pars media was displaced forward (Figs. 19 and 20); thus was produced the exact condition as prior to operation. Further, on be-

Fig. 19. Case 5. Condition as in Figure 18, after filling stomach, postero-anterior vertical posture; opaque level in each locule demonstrated by lines. Note stomach colon relation.

Fig. 20. Case 5. Condition as in Figure 19, left anterior oblique posture. Demonstrating definite bilocular appearance.

ing questioned the patient at this time, stated that during the procedure she experienced the same discomfort as prior to operation.

CONCLUSIONS

1. The result of these experiments and the investigation of the not uncommon naturally produced cases prove that the deformity referred to as cascade stomach is the result of retrogastric pressure which causes forward displacement of the mobile portion of the vertical arm of the stomach from the firmly fixed cardia. The most common source of such pressure is the distended splenic flexure. This condition occurs independently of any organic lesion of the alimentary tract.

2. Since the radiographic appearance of the gastric deformity simulates the true hour-glass stomach and since the cause of this condition is pressure, it is suggested that the term pressure hour-glass stomach is more descriptive to those unacquainted with the fluoroscopic cascade effect.

3. With the uncomplicated case of pressure hour-glass stomach there occurs a definite group of symptoms characteristic of the condition.

4. The condition as described (excluding those cases which are the result of neoplasms) represents a definite clinical entity and the treatment should be directed to the underlying cause, that is, the colon, rather than the stomach.

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GUMMA OF THE THYROID

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GUMMA of the thyroid gland is among the rare manifestations of syphilis. Several recent monographs on goiter scarcely mention it, and textbooks on pathology pass it by with the statement that it is rarely seen.

Davis (1) in 1910 collected 19 cases from the literature, and reported one case. Three of these cases, as noted by Senear (2), did not have gummatous syphilis but rather were manifestations of the secondary stage of the disease. Senear (1918) then recorded 6 cases reported after 1910, and added one of his own.

Schneider (3) in 1918 reported a woman of 48 who had a goiter thought to be malignant, but an exploratory operation and the pathological report proved it to be gumma. This mass disappeared under antileutic treatment.

It is interesting to note that goiter not infrequently is observed in the earlier stages of syphilis. Textbooks on syphilis refer to a moderate enlargement of the thyroid as being frequently seen in the secondary stage of the disease.

Davis (1) calls attention to the possibility of this enlargement being due to administration of iodide. He says: "Swelling of the thyroid occurs frequently in early secondary syphilis. The question as to whether or not this swelling is due to the syphilis or the treatment, or whether there may be two distinct types of thyroid enlargement in secondary syphilis, the one due to the syphilis, the other to the use of potassium iodide, is still open."

Storck (4) in 1917 and Simonton (5) in 1918 reported cases of goiter and syphilis in which the goiter disappeared under treatment. These, however, were apparently not gummata.

Clark (6) in 1914 reported a case of exophthalmic goiter with the typical exophthalmos and pulse of 200, and a strongly positive Wassermann, relieved with mercury and salvarsan. The condition recurred in a year and again responded to treatment.

It is also interesting to observe that Cones (7) in 1922 reported a case of gummatous cervical adenitis and referred to four other cases previously reported by him.

The case of gumma of the thyroid reported by Gomboult (8) in 1884, quoted by Davis, showed gummatous adenitis as well. One of our cases had this same combination.

These two cases were admitted to the hospitals of the Medical College of Virginia:

Case 1. Mrs. R. B., white, female, widow, age 60, was admitted to the Memorial Hospital on October 17, 1922. The chief complaint was constant cough, and the family history was unimportant.

Past history. She had pneumonia at 15, was operated on 20 years ago for "ovarian trouble," and has not menstruated since. Shortly after this she was operated on for hæmorrhoids. One year ago she had asthma.

She has three children living and well, and has had no miscarriages. The past history is otherwise unimportant.

Present illness. Five months ago she noted difficulty in breathing and severe cough. During the last 3 months the cough and dyspnœa have grown very much worse. Soon after the onset of the cough, she noticed a hard mass in the right side of the neck, which has grown slowly to its present size. About 2 months ago, a smaller mass was observed behind this larger one. She now has great difficulty with breathing, and frequently has long paroxysms of hard coughing. She has not noticed any loss in weight.

Physical examination. The patient is an obese elderly woman. Her voice is low pitched and husky and at frequent intervals she has severe paroxysms of coughing. In the lower part of the right anterior triangle of the neck there is a very hard nodular tumor about the size of an egg which rises and falls with the trachea on swallowing. This mass is not attached to the skin but is not freely movable. It seems to be located in the right lobe of the thyroid. Behind this mass and to outer side of the sternomastoid muscle is a small soft mass adherent to the skin, apparently an enlarged lymph node. The heart and lungs are negative. Physical examination is otherwise unimportant.

Fluoroscopic and X-ray plates of the chest fail to show intrathoracic goiter or any other pathology. The Wassermann reaction is four plus positive.

The small node was removed under local anæsthesia and was reported by the pathologist to be gumma.

She was given neosalvarsan, mercury, and large doses of iodide, and was discharged 2 months after admission. On discharge there was no cough nor dyspnœa and both tumors had entirely disappeared. She was seen 8 months later. At this time there was no evidence of the tumor and no cough but voice was still somewhat husky.

CASE 2. E. C., colored, female, married, age 44, was admitted to the St. Philip Hospital on June 2, 1923.

The chief complaint is tumor in neck and difficult breathing.

The family history is unimportant.

Past history. She has been married 9 years, and has one child 22 years of age in good health. Two children died in infancy. She has had no miscarriages. The past history is otherwise unimportant.

Present illness. Nine months ago she noticed a small lump in the lower neck just to the left of the midline. It has grown steadily to its present size. The tumor has always been very hard. There has been no pain. Seven months ago she began to have some difficulty with breathing, and a month later dyspnœa was quite marked. There has been no difficulty in swallowing. A few months ago she noticed that lifting her left arm above her head cut off breathing. She feels weak and has lost 15 pounds in weight. Now she has great distress in breathing, and has a frequent brassy cough.

Physical examination. Patient is a well developed fairly well nourished negro woman suffering with greatly embarrassed breathing.

The neck presents a large goiter involving principally the left side of the neck. The tumor is the size of an orange, is nodular, very hard, and firmly fixed in position. The skin is not adherent to the mass. The largest circumference of the neck is 15 inches.

The heart and lungs are negative.

The general physical examination was otherwise unimportant.

Laryngeal examination showed a normal larynx pushed over to right of the midline.

Blood count: Hæmoglobin, 80 per cent; leucocytes, 7000; polynuclear neutrophiles, 68 per cent; small lymphocytes, 30 per cent; large lymphocytes, 2 per cent.

The urinalysis was negative.

The Wassermann reaction on the blood was four plus positive.

No evidence of substernal goiter or mediastinal growth was found on X-ray.

The basal metabolic rate was minus 26.

The tumor was explored through the usual transverse incision, and found densely adherent to the trachea and surrounding muscles. A small piece was removed for histological examination. This tissue was reported gumma.

The patient was given mercury, salvarsan, and large doses of iodide, and when last seen 2 months after leaving the hospital, she was much improved. The tumor was considerably smaller and softer, and the embarrassment of respiration was entirely relieved. The neck now measured 14 inches in its greatest circumference.

These two cases had symptoms and signs which appear to be typical of the disease, yet the resemblance to carcinoma was so marked that we did not feel justified in making the diagnosis of gumma without the histological examination. The tumor may be large or small; it is usually nodular and always very hard. The skin may or may not be adherent, but the growth is usually adherent to surrounding structures and therefore firmly fixed in position. The surrounding tissues as the gumma grows are destroyed, and the tumor then, as would be expected, soon gives severe symptoms of tracheal and laryngeal pressure, and a number of cases are reported to have died of suffocation even after tracheotomy. Both of our cases had the harsh, brassy cough and hoarse croaking voice without demonstrable vocal cord lesion. This adherence of the tumor to the surrounding structures accounts for the serious interference to breathing on raising the arm on the affected side above the head noted in both of our patients. Both of them complained that they could not fix their hair. This sign would probably be present in any large, hard, adherent goiter. Other lesions of syphilis are doubtless always present.

Demme's three cases (9), reported in 1879, were in children who probably had congenital lues.

Fraenkel's case (10), 1887, had extensive visceral syphilis.

Clarke's case (11), 1897, had multiple gummata.

Davis' case (1), 1910, had widespread involvement.

Thompson's case (12), 1917, had a very marked nephritis.

Symptoms of disturbance of thyroid function are rare. Kohler's case (13), 1892, and Pospelow's (14), 1894, had symptoms of myxœdema which cleared up with treatment.

Our second case had no marked symptoms of hypothyroidism, but the basal metabolic rate was minus 26.

None of the recorded cases of true gummata showed unquestionable symptoms of hyperthyroidism. Thompson's case (12) had a pulse rate of 140, slight protrusion of the eyes, and had lost 50 pounds in weight, but he had advanced degeneration of the cardiovascular system and the kidneys.

We examined the tumor in the second case through a wide exploratory incision. The subcutaneous tissue was not involved, but was quite œdematous. The preglandular muscles were densely infiltrated and could not be separated from the tumor. The larynx was firmly molded in the tumor which had extended across the isthmus into a small part of the right lobe; the left lobe of the gland had apparently been entirely replaced by the tumor mass which was the size of an orange. The tumor was grayish in color, friable and very hard, and bloodless. Microscopically it showed typical gummatous tissue.

From the clinical picture and the appearance at operation, we have no doubt that it originated in the thyroid.

The treatment should consist of mercury, salvarsan, and large doses of iodide. The prognosis is good.

CONCLUSIONS

The following conclusions summarize the cases reported:

1. Gumma of the thyroid is a rare lesion of syphilis.
2. Women are affected more frequently than men (14 of 21 cases).
3. It may result from both hereditary and acquired syphilis.
4. The symptoms are those of mechanical interference from the tumor. As a rule there is no disturbance of thyroid function. When present, it is usually myxœdema, rarely hyperthyroidism.
5. The prognosis with active treatment is good.
6. The appearance of the tumor may lead to confusion with cancer.

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THE GIANT-CELL TUMOR OF BONE AND THE SPECTER OF THE METASTASIZING GIANT-CELL TUMOR

By JOSEPH COLT BLOODGOOD, M.D., F.A.C.S., Baltimore

THANKS to Codman's registry I am able to add almost 100 cases to the number which I have recorded and studied since 1893—in all 177 cases, not including some 12 examples of the giant-cell tumor of the jaw.

The contribution of Ewing and Stone[1] and the literature appearing since 1899 which was not discussed by them has been reviewed.

The metastasizing giant-cell tumor. This has not been proved. Ewing and Stone could not find any evidence from the study of the literature, nor have they observed such a metastasizing tumor in their own experience.

From the very beginning of my studies of cases and literature which were first published in the December numbers of *Progressive Medicine* in 1899, I have followed carefully the literature and have gradually accumulated more than 1,000 cases of bone tumor, and I have never been able to prove that the benign type of the giant-cell tumor metastasizes.

Malignant giant-cell tumor. Almost every surgical pathologist or pathologist who has studied bone tumors and who has recognized the benign group, first isolated by Lebert in 1850 and called *myeloid tumor* and again clearly pictured in 1853 by Paget in his *Surgical Pathology*, has feared or described a bone tumor as chiefly a giant-cell tumor, but containing cells which were histologically suggestive of malignancy.

It impresses me, therefore, as of great importance to present my evidence which is, that for practical purposes one need not fear a malignant giant-cell tumor nor fear metastasis from any typical giant-cell growth of bone.

As a matter of fact all tumors in which giant cells of the epulis type predominate do not metastasize and repeated local recurrences are rarely associated with a change to malignancy.

Ewing and Stone are rather of the opinion that their case was primarily a benign giant-cell tumor in the upper head of the tibia, and that the change to malignancy followed incomplete curetting and the irritation of infection and radium on the recurrent tumor.

However, there might be some dispute as to whether the primary tumor was of the benign giant-cell tumor type. Francis Carter Wood who examined the sections first was very suspicious of malignancy.

Recurrence in the benign giant-cell tumor. Of the 177 cases which I have studied, there is not a single example of death from metastasis, and in 100 cases it is from 3 to 30 years since the patient was first treated. As the average age of patients having benign giant-cell tumor is between 20 and 30, the majority of them is living today.

Of the 93 patients so far subjected to curetting operations, 18 had recurrences and were subjected usually to amputation, a few to resection. In this group there was often more than one curetting, in a few there was evidence of infection, and a few had radium introduced into the bone cavity. Yet, in none of these cases was there any microscopic evidence of malignancy in the recurrent tumor when these sections came to final restudy. However, many of the pathologists who studied first the sections of the recurrent tumors, expressed the written opinion that they were malignant. Therefore, in spite of recurrence and in a certain number of cases of a diagnosis of malignancy, none of them in which ultimately the tumor was completely removed by resection or amputation died of metastasis.

The observation, therefore, of Ewing and Stone, of recurrence and metastasis after curetting and of ultimate death after amputation, is unique if the original tumor when submitted to the registry is accepted as one of the benign giant-cell type.

Of the 75 cases ultimately cured by curetting, in some 6 or 7 there has been more than one curetting, and yet, the patients have remained well years. I have reported an ex-

[1] Arch. Surg., 1923, vii, 280.

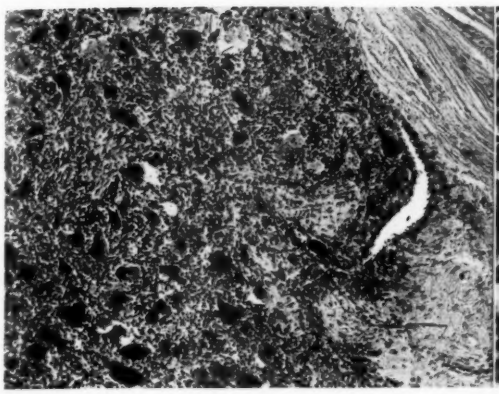


Fig. 1 (at left). Pathol. No. 26091. Low power. Typical giant-cell tumor. The fibrous tissue to the right is the scar of an exploratory operation in which the bone shell was removed. Yet the tumor had remained circumscribed.

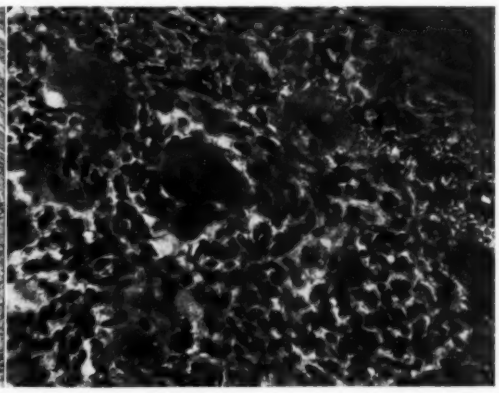


Fig. 2. Pathol. No. 29069. High power of area in Figure 1. Giant cells of the epulis type embedded in the typical cellular stroma; some free blood; a few definite capillaries.

ample in which the tumor in the lower end of the radius was twice curetted incompletely, then incompletely resected. Eighteen months after the first operation and some 6 months after the last I removed an encapsulated giant-cell tumor in the defect left by the removal of the lower end of the radius, and transplanted bone. This patient lived some 12 years without recurrence and with good function of the wrist.

Therefore, I have records of some 24 cases in which recurrence has taken place after curetting in which the patients have not died of metastasis.

The cause of recurrence after curetting. I cannot find the cause in any change that can be recognized in the gross local growth or in the histology. Recurrences have taken place when the X-ray and operative evidence indicated an intact bone shell. Permanent cures have been obtained by curetting alone when the X-ray and operative evidence disclosed one or more perforations of the bone shell, or even complete destruction of the bone shell.

If one mixes the section of the tumors which have not recurred after curetting with those that have, there are no distinguishing points with either the low or the high power. Preoperative and postoperative X-ray, radium, or toxin treatment have not prevented recurrences. The only cause for a recurrence seems to be some faulty technique in the operation. Yet, this is not absolutely proved, because some cases incompletely curetted, have not recurred.

Personally, I have curetted 6 cases. In every one the curetting was thorough, and in those situated in the upper end of the tibia (5 cases) the operation was made bloodless by a rubber band; the one in the upper end of the humerus was done without constriction. In the early cases the bone cavity was swabbed with pure carbolic acid followed by alcohol. Later cases, in addition were cauterized with 50 per cent zinc chloride, and in the most recent operations the curetting was done with the electric cautery. Some of the wounds have been packed, others have been closed. In all of them, however, infection was prevented.

My evidence, therefore, suggests that if curetting is done, it should be thorough and if possible bloodless. The bone shell should be cauterized with pure carbolic followed by alcohol, packed for a few minutes with a piece of gauze saturated with 50 per cent zinc chloride, and I am inclined to think the curetting should be done with the electric cautery.

As I read the operative notes of the cases in which recurrence has taken place, I get the impression that the tumor was incom-

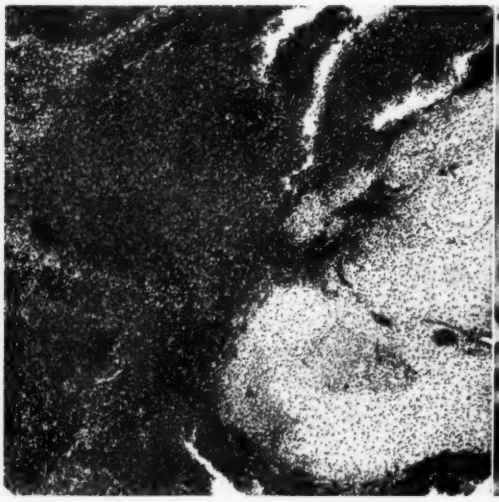


Fig. 3 (at left). Pathol. No. 17436. Low power. Typical giant-cell tumor area at right; ostitis fibrocystica above.

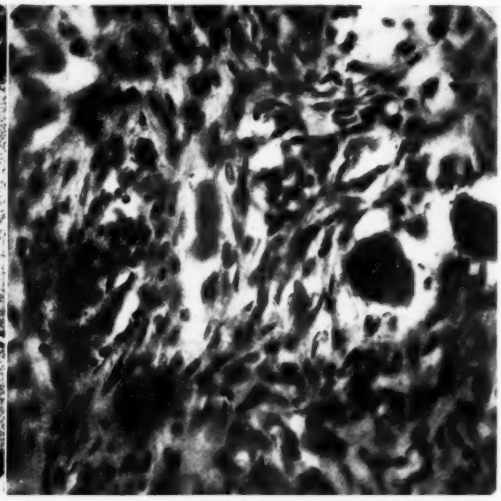


Fig. 4. Pathol. No. 17436. High power of area shown in Figure 3. Giant cells of epulis type. Stroma contains more spindle cells, more eosin-staining intercellular substance and less blood than in Figure 2.

pletely removed, and thermal or chemical cauterization was not employed.

In a second report I propose to give in greater detail the results of the study of these 177 cases, taking up the question of treatment with X-rays, radium, and the toxins, and discussing whether X-rays and radium should be the first treatment of choice, or whether operation should be considered first. The illustrations, Figures 1 to 12, are the most im-

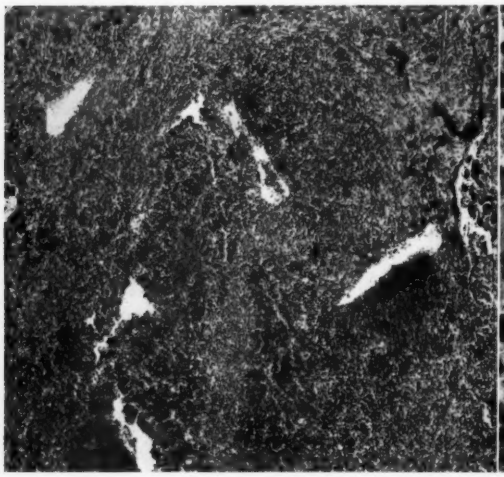


Fig. 5 (at left). Pathol. No. 27001. Low power. Giant cells not as distinct as in Figure 1; less ostitis fibrosa than in Figure 3.

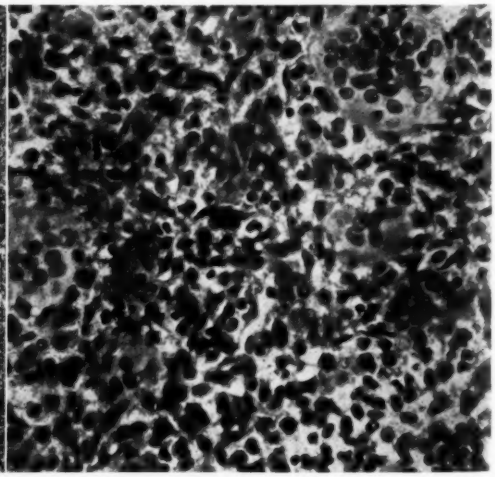


Figure 5. Compare giant cells with those in Figures 2 and 4. Morphology of round cells in which giant cells are embedded; more suggestive of sarcoma than Figures 2 and 3.

Fig. 6. Pathol. No. 27001. High power of area shown in

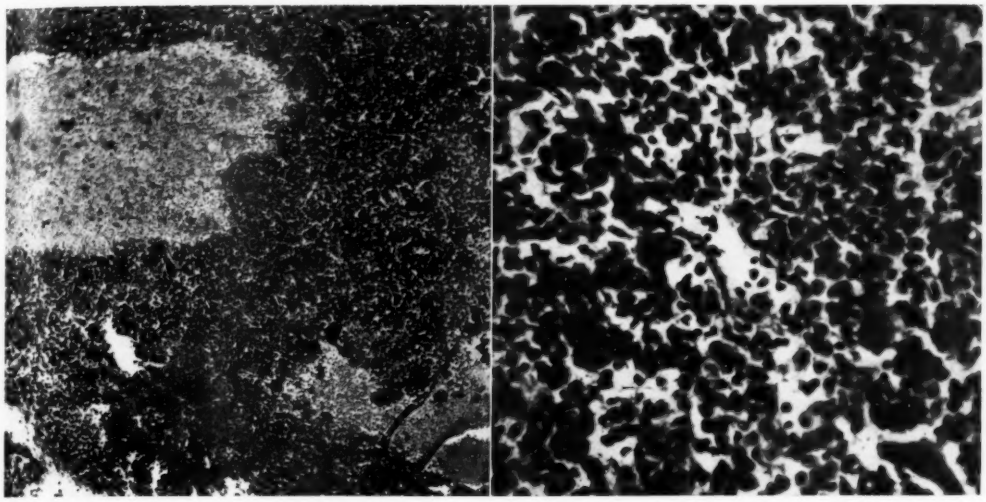


Fig. 7 (at left). Pathol. No. 26792. Low power. The predominant giant cell in cellular tissue mixed with hæmorrhage resembles the benign giant-cell tumor.

Fig. 8. Pathol. No. 26792. High power of area shown in Figure 7. Very cellular; no typical giant cells. Eight pathologists diagnosed this sarcoma; two diagnosed a variant of the giant-cell tumor. This tumor occupied the upper epiphysis of the humerus with bone shell intact; it was curetted in October, 1920, by Dr. Bunts, of Cleveland. There followed chemical disinfection, radium, X-rays, Coley's serum. In April, 1924, the patient is reported as well; and there is no evidence of local recurrence or general metastasis. See Figures 9 and 10 for high power of areas.

portant part of this paper. They picture the common benign giant-cell tumor, the variant of the giant-cell tumor, and a sarcoma which a few pathologists look upon as an extreme variant.

Microscopic picture of the giant-cell tumor and its variants. In the previous pages I have tried to emphasize two facts which appear in the literature since Lebert, Paget, and Nélaton, and are found in the original records of the 177 cases which I have just restudied.

The first fact is, that with regard to the metastasizing giant-cell tumor my conclusion agrees with that of Ewing and Stone, and up to the present time no case has been observed which can be confirmed by restudy.

The second fact is that there is a variability, especially in high-power pictures, in size and morphology of the cellular tissue in which the giant cells of the epulis type are embedded.

When all giant-cell tumors were looked upon by the majority of pathologists as sarcoma and not separated as Lebert, Paget, and Nélaton did, little attention was paid to the morphology of the cells in which the giant cells were embedded, because when considered malignant, i.e., sarcoma, what difference did it make? But later, as other observers began to agree with Lebert, Paget, and Nélaton, the common typical giant-cell tumor was recognized and placed in a group by itself. But every now and then a tumor, central in bone, with and without an intact bone shell, suggesting the giant-cell tumor in the gross and very like the giant-cell tumor under the low power of the microscope, presented under the high power a cellular tissue surrounding the giant cells of such an unusual appearance that the diagnosis of sarcoma containing giant cells of the epulis type was made. Yet, when these patients are followed, we have yet to observe metastasis, and when the cases are subjected to the registry, there is a difference of opinion among the pathologists examining the same sections.

Microscopic illustrations. Figures 2 to 7 picture the low and high powers of the typical giant-cell tumor about which there has been no disagreement among the pathologists. Figures 8 to 11 picture a case which might be

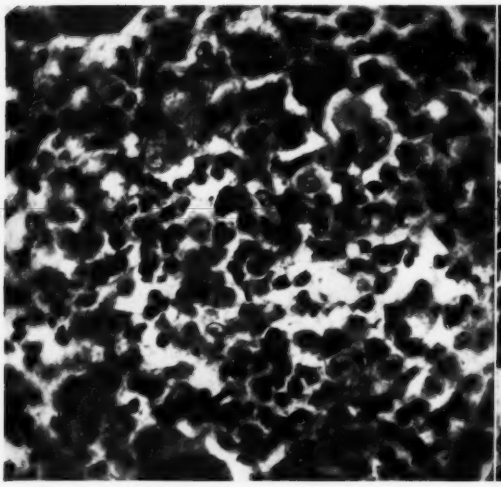


Fig. 9 (at left). Pathol. No. 26792. High power. Note giant cells of the epulis type in a cellular stroma suggesting sarcoma. For legend see Figure 8.

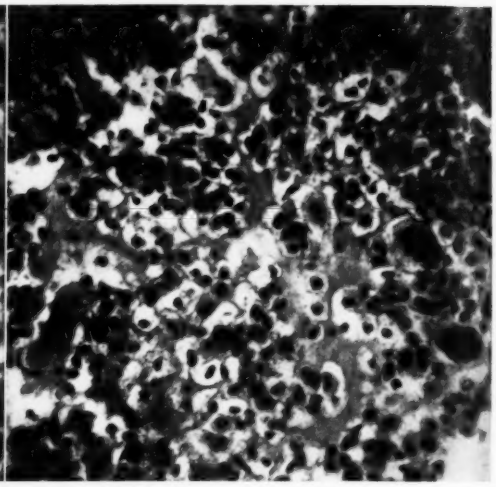


Fig. 10. Pathol. No. 26792. High power. Note the cartilage cells in a tumor area similar to Figure 8. For legend see Figure 8.

called, if there be such a thing, a malignant giant-cell tumor, or a sarcoma containing giant cells of the epulis type. On the interpretation of these sections there is disagreement and, as noted in the legends, this patient has remained well now 3 years since the curetting of the tumor in the upper end of the humerus.

As we rarely see metastasis in sarcoma of bone after the third year, the chances are good that this patient will remain well.

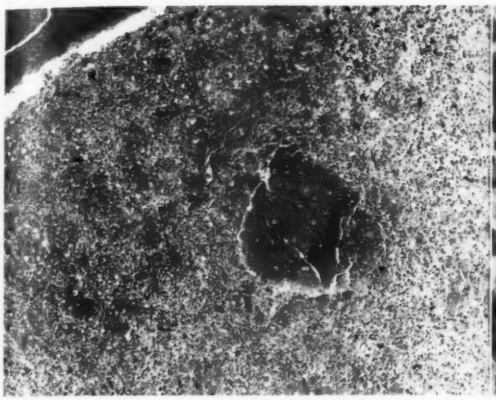
Figures 12 and 13, in the opinion of eight pathologists with whom I agree, present a histological picture entirely different from the giant-cell tumor and resemble the typical osteogenic sarcoma. In it there are no giant cells of the epulis type. Yet, two pathologists have expressed the view that it is a variant of the giant-cell tumor, and one that it is chronic inflammation. The patient is well 10 years after amputation.

Is there a central sarcoma with intact bone shell? The more I restudy my own cases, the more I exclude true sarcoma from this group.

In the *Annals of Surgery* for August, 1910, I reported three cases of the so-called bone aneurism (malignant hæmorrhagic bone cyst) and gave the literature. In the first case (loc. cit., Fig. 39) Dr. Finney first operated in 1905 and did not expose the tumor until he had passed through a bone shell. The cavity contained blood, and was lined with friable hæmorrhagic tumor tissue resembling the giant-cell tumor. The sections which I examined showed no giant cells of the epulis type, but an ordinary sarcoma, not unlike the osteogenic type. There was recurrence and an amputation in 3 months followed by death in 1 year, due to metastasis. The sections exclude a giant-cell tumor. However, the photograph of the specimen after amputation shows a bone shell thicker and more worm-eaten than that seen in the giant-cell tumor.

The second case (loc. cit., Figs. 40 and 41) may have been a periosteal tumor—one could not tell. There was a huge cavity with the head of the humerus above and a bit of the shaft below. Between these two points the shaft was destroyed. In the third case (loc. cit., Figs. 42 and 43) the hæmorrhagic cyst was outside the shaft of the humerus.

So of these three cases of bone aneurism, all of which are microscopically sarcoma, and all of which were fatal because of metastases, there was only one which could have been confused with a central giant-cell tumor with intact bone shell.



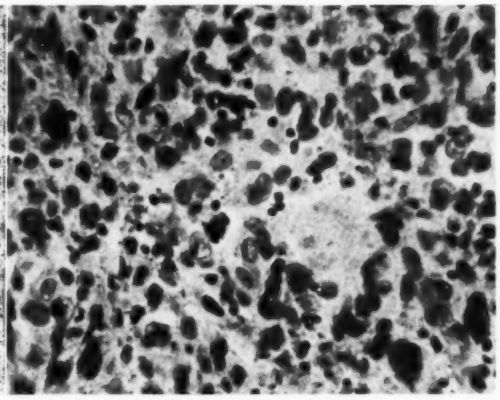


Fig. 11 (at left). Pathol. No. 14229. Low power. Compare with Figures 1, 3, 5, and 7. Hæmorrhage predominates in the picture. There are many nucleated cells suggesting typical giant cells. For high power see Figure 12.

Fig. 12. Pathol. No. 14229. High power. No typical giant cells of the epulis type. Large multinuclear cells; giant multinuclear cells. Reported by Bloodgood in the *Journal of Radiology*, March, 1920 (Figures 20 and 21), as an example of a malignant hæmorrhagic cyst—a sarcoma. In Codman's Registry (No. 106) five pathologists agree as to sarcoma; two favor a variant of the giant-cell tumor; one, chronic inflammation. The tumor occupied the lower end of the femur. The patient is living and free from recurrence 10 years since amputation, aged 71.

Ten years later in the *Journal of Radiology* for 1920 I classed as central sarcoma 25 cases. Two of these, diagnosed malignant bone cysts, I now retract. One on restudy proved to be a giant-cell tumor and the patient is living 5 years after the amputation. The other patient with a latent bone cyst (ostitis fibrocystica) is living 7 years after the amputation. Then, there is a third malignant bone cyst which two of my colleagues look upon as a variant of the giant-cell tumor reported in this paper in Figures 11 and 12.

This leaves but 5 malignant bone cysts, and as 4 of these had periosteal involvement, they must be excluded.

On restudy, the 11 examples of central sarcoma of the very cellular type, all of which can be restudied from the gross and X-ray picture, are found to be bone tumors with both periosteal and central involvement.

The only true central sarcoma with intact bone shell reported in that journal of which we have had examples since, are either chondrosarcomata or myxosarcomata which present an entirely different gross and microscopic picture from that of the giant-cell tumor.

CONCLUSIONS

On careful reinvestigation of all of my material I am unable to find a central lesion with an intact bone shell which resembles the giant-cell tumor in the gross and more or less microscopically, that has not remained free from metastasis. Many of them are free of recurrence after curetting. Therefore, at the present time, if a surgeon explores a central bone tumor in which the X-ray, palpation, and exploration exclude tumor tissue outside the bone shell, or the capsule about the bone shell is destroyed, he can be certain that the only possible sarcoma is one resembling in the gross and in the section the osteogenic sarcoma of the chondromyxo type—a tumor easily to be distinguished from the giant-cell tumor or ostitis fibrocystica. If this statement is true, it simplifies the diagnosis, because the cellular pathology of the giant-cell tumor in a certain percentage of cases, especially under the high power, has been confusing to experienced pathologists, and even today is incorrectly diagnosed sarcoma leading to unnecessary amputation or mutilating resections. The mutilation is especially great when the resection is done in the jaw.

PAPILLARY EPITHELIOMA OF THE KIDNEY PELVIS

Report of a Case

By EVERETT E. ANGLE, M.D., New York

THE literature shows that papillary tumors are seldom found in the pelvis of the kidney or in the ureters, although they are common among lesions of the bladder.

Watson and Cunningham found only one lesion in diagnosing 94 cases of renal and perirenal tumors collected at the Boston hospitals during a period of 10 years.

Albarran found 42 cases of pelvic renal tumor reported in the literature up to 1900, 18 of these were papillomata.

In May, 1919, E. S. Judd reported an interesting case but the pre-operative diagnosis was surgical left kidney. Pyelography was not being done at that time.

In the *Lyon médical*, November 25, 1920, a case of epithelioma of the kidney was described. Painful hæmaturia was the only symptom. Even when the kidney was exposed, the diagnosis was dubious until after exploratory nephrotomy.

Wilson in 1912 reported three papillomata and according to Braasch only five had thus far been noted at the Mayo Clinic. McCown in a recent publication reviewed the entire literature and found only 10 cases reported by American authors and 38 from foreign countries.

Kretschmer mentioned 2 cases and Stevens, Hyman, and Goldstein each mentioned personal experience with one.

In November, 1921, Miller and Herbert reported one more case of papillary tumor of the renal pelvis, but theirs was one of the first cases to be diagnosed correctly before operation and the diagnosis was aided by a pyelogram with thorium solution. The pyelogram showed a large filling defect and the tumor filled to bulging the renal pelvis.

Pathology. Ewing[1] in his book on neoplastic diseases says that epithelial tumors of the renal pelvis take one of three forms: first, that of a benign papilloma which may affect any portion of the renal pelvis or ureter; second, that of a papillary epithelioma; and third, that of an alveolar carcinoma. His description of the second form fits our case very nicely. He says: "Papillary epithelioma shows overgrowth of the cell layers of benign papilloma, atypical cell forms, and infiltrating qualities. In infiltrating tumors the papillar structure is soon lost and the growth is alveolar or diffuse or scirrhus.

"The transformation of benign into malignant papilloma has been made clear by Albarran. In Battle's case simple papilloma curetted from the pelvis soon recurred with malignant structure. Pantaloni observed a recurrence in malignant form in the scar after nephrectomy for a uniformly benign papilloma. In portions of chiefly benign papillomata, especially at the base, atypical overgrowth is sometimes observed. The long duration of symptoms preceding the discovery of a malignant papilloma suggests the development of a slowly growing benign tumor followed by malignant transformation."

A report of our case may be of interest.

An English Jew, age 60, entered the hospital, October 18, 1922, complaining of bloody urine. His family history is not remarkable and his past history shows him to be a man of exceptionally good health.

History of hæmaturia. The present illness began 2 years ago with blood colored urine passed painlessly.

Since this time he has had intermittent attacks of hæmaturia. Occasionally when he voided there would be a few drops of blood at the begining of the stream but most often the bloody urine was terminal in type. For the past few weeks he has noticed the presence of three of four stringy clots which he voids at the end of urination.

On being questioned as to the presence of pain, the patient states that he has observed a very slight pain in the left lumbar region during the past month. He has had no dysuria, frequency, or diminution of the urinary stream. His appetite is good. He has not lost weight or strength. He seeks advice solely on the solicitations of his family, who have become alarmed over his condition.

Physical examination. Physical examination reveals a fairly well developed and well nourished man. He is somewhat anæmic but not acutely ill.

[1] W. B. Saunders Co., 1919.

The head is negative to external examination. The pupils are equal, regular, and react to light and distance. The mucous membrane is clear but of lessened hæmic content. There is no adenopathy. The chest is well developed. The lung fields are clear. The heart is not enlarged. Sounds are regular and of good quality.

The abdomen is slightly protuberant, soft and tympanitic throughout. No spasm, masses, or tenderness are found. Kidneys are not felt, bladder is not distended. No hernia is present.

Penis and scrotal contents are normal. Prostate is not enlarged. Seminal vesicles are not felt. Extremities are normal, reflexes are active throughout.

Cystoscopic examination. After the usual preparation with Butyn 1 per cent, used for local analgesic action, the instrument was passed without difficulty. The interior of the bladder was searched carefully but no evidence of tumor was discovered. The fundus was slightly trabeculated and there was a little overgrowth of the post-trigonal region. This tissue did not resemble in any sense of the word a tumor. The vesical trigone was usual in appearance. The ureteral orifices were normal in size, location, and appearance. The vesical orifice was interesting in that there was a moderate intrusion of the subcervical group on the floor of the bladder neck. This was easily traumatized and bled.

Lead catheters No. 6 French passed to the kidney pelvis on each side without obstruction. Clear fluid appeared on the right, hazy on the left. The report of the ureteral specimens was as follows:

	Right	Left
Amount	8 ccm. in 10 min.	10 ccm. in 10 min.
Urea	18 gms. per liter	12 gms.
Phenol-sulphone-phthalein	5 min. appearing time 8 per cent in 10 min. Rare pus in clumps Culture reports, negative.	12 min. 1 per cent in 10 min. Epithelium, no pus Pyelogram as shown.

The urine showed a faint trace of albumin and a few red blood corpuscles, nothing else. The phthalein output was 25 per cent the first hour and 15 per cent the second. The blood chemistry taken the following day showed a urea nitrogen of 5.9 milligrams per 100 cubic centimeters, a sugar of .091 per cent, and a carbon dioxide plasma combining power of 60.5 volumes per cent.

The X-ray examination of the genito-urinary tract before and after injection showed catheters introduced into both ureters to renal pelves. The right kidney was normal in size, shape, and position. Injection of the left kidney revealed a dilated pelvis with an irregular outline of the lower pole suggestive of growth in pelvis.

Operative findings. After considering this data an operation was decided upon. October 20, with the patient under a gas-oxygen anæsthetic, Dr. Lowsley exposed the left kidney with an incision extending from the costovertebral angle to a point above the crest of the ilium.

Fig. 1. Pyelogram of left kidney.

The kidney fat was entered by blunt dissection and the kidney palpated *in situ*. No increase in size was made out. On delivery of the kidney into the wound there was noted an increase in the lobulations at the lower pole with an increased vascularity in one small area, no larger than 1 centimeter in diameter. On careful palpation of this area an increased sense of resistance was noted. No definite tumor could be made out.

Cystoscopic findings. What was to be done? The operative findings would certainly stagger any surgeon unless he knew the pre-operative findings and knew that he could rely on them.

The kidney was removed. The ureter was tied at a distance of 8 centimeters from the pelvis and the wound was closed in the usual manner with a cigarette drain placed at the site of the kidney. Those at the operation were too curious to find what pathology the kidney showed to wait for the pathologist, and opened it at once, and found a growth involving the pelvis. The pathological report came back as carcinoma of the pelvis of the kidney.

The entire growth was no larger than a dollar. Sections of the ureter examined microscopically showed no evidence of involvement.

Convalescence. The patient was sent back to the ward in excellent condition. His cystolic blood pressure did not go below 120 and there were no signs of shock. He made an uneventful convalescence and left the hospital apparently cured. In view of the pathologist's report he has returned for several applications of radium.

When last seen 8 months after the operation he was feeling well and working. X-rays taken of his skeleton showed no evidence of metastases.

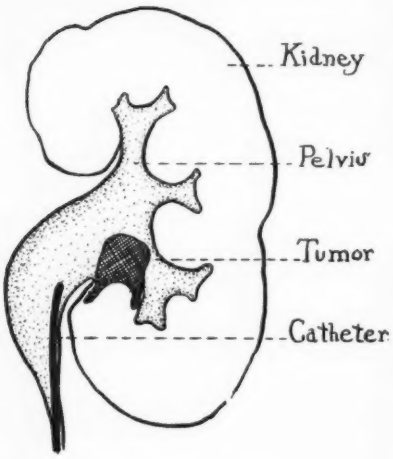


Fig. 2. Diagram of pyelogram.

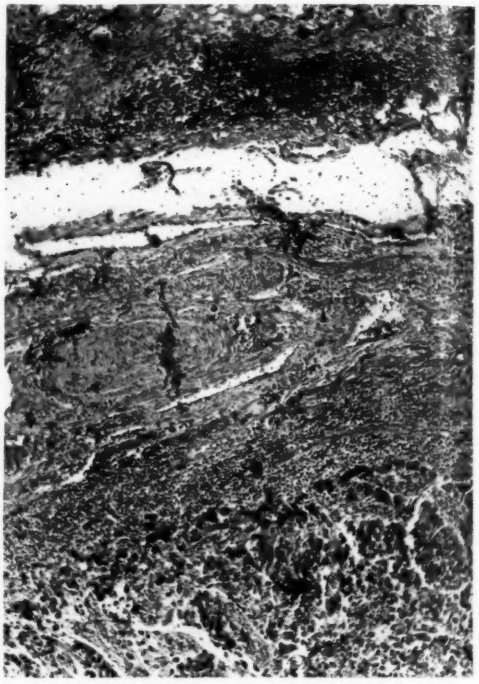


Fig. 3. Photomicrograph of the tumor.

SUMMARY

To summarize then, we have a patient who has had hæmaturia for 2 years. Hæmaturia is his presenting symptom and his only symptom. The physical examination is negative, *but* the urological investigation gives a clear-cut picture. The right kidney is doing most of the work of purifying the blood. Phthalein appears in 5 minutes on the right and 8 per cent is excreted, while on the left, it appears only after 12 minutes and 1 per cent is excreted. In addition to these facts the pyelogram shows a filling defect in the pelvis of the kidney.

In other words modern urology gives us the means of making an early diagnosis of tumor of the kidney. We are agreed that early diagnosis and radical surgical treatment combined with radiations give the best hope of success in treating cancer where the kidney is involved.

ENDOCRINE DISTURBANCES AND NON-UNION OF FRACTURES

EXPERIMENTAL STUDY[1]

BY ANATOLE KOLODNY, M.D., CHICAGO
College of Medicine, University of Illinois

THE time has passed when the physician taking care of the patient is held responsible for non-union of fractures. The most skillful surgeon can be unfortunate enough to list among his patients one with an ununited fracture. What then are the causes of non-union?[2] The theories most frequently advanced regarding the etiology are: interposition of soft tissues; displacement of bone fragments; scars of the soft tissues surrounding the fractured bone ends; deficient immobilization; and finally the so-called pathological constitution of the tissues originating from the mesoderm. Numerous as they are, they are nevertheless unsatisfactory in the explanation of all cases of non-union. There are cases of non-union which, according to Bier, mock all theories. This perhaps is the reason why Bier offers the theory of local hormone stimulation of the bone producing elements in traumatic bone injuries. It is not difficult to see that these numerous theories are all based upon the element of local disturbance; in other words they localize the etiological factors at the seat of the fracture.

It has always seemed to me that the opinion that non-union of fractures is a result of an exclusively limited local disturbance is wrong. The question has presented itself to me: what rôle, if any, do the frequent endocrine disturbances play in the healing of fractures? In an attempt to answer the question I have carried out experimental investigations on the testes, the pancreas, and the thyroid. The results of this work are given in the following report.

All of my work has been done on dogs. Twenty-eight experiments were performed on 28 dogs, not counting the controls. I have always tried to secure controls of as nearly as possible the same age as the experimental animals. Of the twenty-eight experiments nine were to demonstrate the relationship between the disturbances of testicular secretion and healing of fractures; eight for the pancreas, and eleven for the thyroid.

Testes. It is a well known fact that the condition known as pubertas præcox virilis is accompanied by premature closing of the epiphyseal synarthrosis, and that in genital hypoplasia, or so-called late maturity we see an increase in height, especially in the length of the legs, due to a late closing of the epiphyses. Evidently, this fact has long been known to farmers who increase the size of roosters and pigs by castration. The relationship between secretion of the sexual glands and the development of the skeleton has been recently demonstrated by Steinach whose feminized and masculinized rats developed a skeleton resembling that of the opposite sex. This relationship is also shown in cases met with in clinical practice. These cases, still seldom recognized, belong to the so-called Froelich syndrome. Three instances observed in Dr. Steindler's service in the Iowa State University Hospital in 2 years showed coxa vara accompanied by prominent obesity, small penis and testicles. Notwithstanding this relationship we did not find in the literature anything dealing with the question of the influence of testicular secretion upon the healing of a fractured bone.

Among the animals chosen for the investigation of this question were five puppies between 5 and 8 weeks old, and four adult dogs. The experiments in this series were conducted as follows: The animal was castrated. Three weeks after the operation I produced a closed fracture of both bones of the left forearm. The fractured limb was immobilized. X-ray examinations were made 14, 21, and 28 days after the fracture. Before the X-ray examination the case was removed to obtain a clearer picture and replaced immediately after exposure.

[1] I do not speak here about the spontaneous pseudarthroses in bone grafts, and about pathological bone fractures.

[1] Presented before a meeting of the Medical Society of the Iowa State University Hospital in May, 1923.

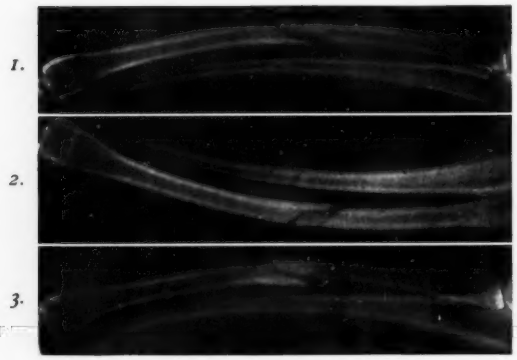


Fig. 1. Normal adult dog. Closed fracture; 14 days post fracturam.

Fig. 2. Same fracture as that shown in Figure 1; 21 days post fracturam.

Fig. 3. Same fracture as that shown in Figure 1; 28 days post fracturam.

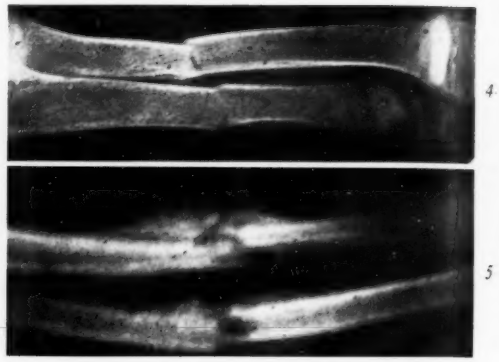


Fig. 4. Castrated puppy. Closed fracture; 28 days post fracturam.

Fig. 5. Not castrated puppy. Closed fracture; 28 days post fracturam.

One puppy died of bronchopneumonia 8 days after the fracture was produced. There was no evident abnormality in the healing process of the fractures of the castrated adult dogs when compared with a normal adult dog. But in none of the four castrated puppies did healing of the fracture occur by the twenty-eighth day. In two of them there were no signs of beginning callus formation. Compare Figures 4 and 5.

We see clearly that normal testicular secretion is indispensable for healing of fractures in animals which have not reached maturity and is not essential in adult animals.

Pancreas. The relationship between pancreatic disturbances and pathological conditions of the skeleton is barely mentioned in the literature. Dodds,[1] quoting Hodgson and Stroeltzner, suggests that there is a lesion of the pancreas in rickets and that this problematical lesion leads to poor production of fatty acids and poor absorption of calcium.

I attempted to clear up the relationship between pancreatic disturbances and healing of fractures by means of eight experiments on eight adult dogs. Each experiment consisted of the following: A laparotomy was done; the whole left ramus of the pancreas (cauda pancreatica) and the portion of the inferior transverse ramus (caput pancreatis) which is not adherent to the duodenal wall were removed. The remaining portion represented about one sixth of the entire pancreas. This portion was always sufficient to prevent diabetes in the dog, as far as we could judge by the available methods of examination (urine analysis and sugar tolerance test). We considered the avoiding of diabetes in the dogs to be most important in our investigation, since diabetes interferes with all regenerative processes of the organism. Four weeks after the pancreatectomy, all clinical signs of the laparotomy having long before disappeared, we produced a closed fracture of one or both[2] bones of the left forearm of the dog. The limb was immobilized. X-ray examination was made after 14, 21, 28, and 42 days, when finally the animal was sacrificed.

Figures 1, 2, and 3 of this paper show the healing of a closed fracture of both bones of the left forearm of a normal adult dog. Figure 3, made 28 days after fracture, shows a complete consolidation of the callus and a completed healing of the fractured forearm in a normal dog. In our pancreatectomized dogs the formation of callus was markedly postponed, and, there was no healing of the fractures even after 42 days. Figures 6, 7, and 8 show the respective final results of several of those cases.

[1] Brit. M. J., 1922, April.

[2] A fracture of one bone of the forearm is more convenient for immobilization of the limb.

Fig. 6. Partial pancreatectomy. Closed fracture; 21 days post fracturam.

Fig. 7. Same fracture as that shown in Figure 6. Blood vessels injected; 42 days post fracturam.

We see therefore that pancreatic disturbances, even such as cannot be recognized by all our laboratory tests and methods, interfere with healing of fractures.

Thyroid. Some time ago thyroid extract was used in the treatment of delayed union of fractures, but its use was based upon empirical grounds only. I have not found anything in the literature dealing with the question of the relationship between thyroid disturbances and bone regeneration. On the contrary, we find a relatively rich literature on the influence of the parathyroids upon calcium assimilation. McCallum and Erdheim[1] both proved that deficiency of the parathyroids leads to deficiency of calcium in the organism and to tetany.

For the investigation of the relationship between thyroid disturbances and healing of fractures I used eleven adult dogs. In five of them we removed the whole thyroid gland and in the remaining six only one lobe and two-thirds of the other lobe were removed. The thyroidectomy was intracapsular, so as to avoid the possibility of traumatization of the parathyroids, which, in dogs, lie behind the upper poles of the thyroid, extracapsular. We have been forced to omit the basal metabolism test on account of technical difficulties, but Kottman's test showed a prominent hypothyroidism even in the cases where a part of the thyroid had been left. All the animals showed a prominent obesity at the end of the experiment. Four weeks after the operation a closed fracture of the forearm was produced. The limb was immobilized. X-ray examinations were made after 14, 21, 28, and 42 days.

[1] Frankf. Ztschr. f. Path., 1911.

Fig. 8. Partial pancreatectomy. Closed fracture; blood vessels injected; 42 days post fracturam.

Figures 9, 10, and 12 show that normal union has not taken place 42 days after fracture. Figures 7, 8, 11, and 12 show the exuberance of the intra-ossal blood vessels in the fractured bones. This is the "fracture-hyperæmia," which in dogs normally subsides about the 25th day after fracture, and which still persists in our animals with endocrine disturbances after the 42nd day.[2]

From Figures 9, 10, 11, and 12 we see that a normal thyroid function is absolutely essential for the healing of fractures.

DISCUSSION

Our experiments of the first series prove that normal testicular secretion is essential for regeneration of bone in animals which have not yet reached maturity, and that it is of no demonstrable importance for regeneration of bone in adult dogs. We realize that laboratory captivity itself influences the development of young puppies, so that probably not the whole effect can be ascribed to castration; but still our experiments proved beyond any doubt that testicular disturbances are of very serious consequence in the healing of fractures in young animals.

[2] The question of the "fracture-hyperæmia" I dealt with in my paper, "The rôle of the periosteal blood supply in union of fractures." Anatole Kolodny. J. Bone & Joint Surg., 1923, October, p. 710.

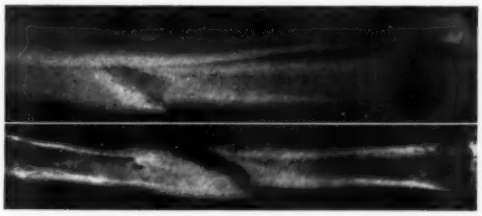


Fig. 9. Complete thyroidectomy. Closed fracture of the radius; 21 days post fracturam.

Fig. 10. Same fracture as that shown in Figure 9; 42 days post fracturam.

Fig. 11. Complete thyroidectomy. Closed fracture of the left radius. Blood vessels injected. The right radius for comparison; 42 days post fracturam.

Fig. 12. Complete thyroidectomy. Closed fracture of the left forearm. Blood vessels injected. The right forearm for comparison; 42 days post fracturam.

As far as the experiments on the pancreas are concerned, it can be argued that the partial pancreatectomy produced malnutrition in the animals and led indirectly to nonunion of the fractures. That such an argument is ill founded we see from the fact that all our pancreatectomized animals gained in weight during the experimental period, and the urine examination and sugar tolerance test were negative for diabetes.

We would like to emphasize again that in all our thyroidectomized dogs the parathyroids were left intact in the body, as was proved at necropsy.

It is advisable to make clear one more point. As has been mentioned above, the animals in the two last series of experiments were kept for a period of 6 weeks after the production of the fracture. We know that this period of time is sufficient to enable us to judge the results because in normal adult dogs a fracture of the bones of a forearm will heal in less than 28 days. Figures 13 and 14 also show that 42 days were sufficient in our cases. Union cannot be expected where we have a formation between the bone fragments of a dense fibrous septum with beginning cleavage. The cartilaginous septum (Fig. 14) still persisting in the callus 42 days post fracturam is also the best evidence of delayed union.

The results of our experiments prove beyond any reasonable doubt that endocrine

Fig. 13. Section through the fibrous septum between the fractured bone ends.

Fig. 14. Section through the cartilaginous septum between the fractured bone ends.

disturbances play a prominent rôle in the suppression of regenerative processes of bone. We are far from insisting that these endocrine disturbances influence bone regeneration alone. But from our results we must conclude that among the other effects of endocrine disturbances is the suppression of healing of fractures. On the other hand we do not think that all cases of delayed union or non-union of fractures are to be attributed to endocrine disturbances. Nevertheless in a number of cases the cause of non-union is endocrine disturbance.

Further we do not pretend to have made an exhaustive investigation of this problem. For example we did not touch upon other endocrine glands, as the adrenals and the hypophysis; nor did we control our experimental animals by means of organotherapy. We believe, however, that our results will attract the attention of the surgeon to this aspect of the old question of non-union of fractures.

BREAST HYPERTROPHY—NON-SURGICAL BREAST CONDITIONS

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BREAST hypertrophy is a local or general increase in the volume of the breast gland resulting from an increase in size or quantity of its constituents. Thirty or more terms have been invented to designate different histological or clinical phases of the same process, the best known of which are chronic cystic mastitis, senile parenchymatous hypertrophy, abnormal involution, Shimmelbush's disease, cobblestone breast, lumpy breast, painful breast, etc. The expression "breast hypertrophy" is used as a group term in a purely clinical sense because all these conditions are curable without the aid of surgery and therefore form a natural group, and because of the histological pictures represented by the three-score or more names are found in breasts that are clinically normal, and are only brought to the attention of the patient or physician when they are attended by clinical manifestations, such as lumps or tenderness. Other terms such as "lumpy breast" or "non-surgical breast conditions" are equally fitting, but hypertrophy is preferable in that it implies both a totally different process from tumors or infections and a totally different form of treatment.

In a statistical review of all the types of breast conditions treated in the University of California Hospital, or in the out-patient department of the University of California Medical School, together with a restudy of the pathological material in the surgical pathology laboratory, there were collected 125 cases of breast hypertrophy. Sixty-eight were treated surgically and studied histologically. Among the latter sixteen were diagnosed as chronic cystic mastitis, nine as senile parenchymatous hypertrophy, nineteen as abnormal involution. The remainder were given miscellaneous diagnoses among which hypertrophy was the most common. All of the 125 cases were studied as a group from a variety of standpoints, but especially as regards their identification by clinical means, their etiology, and their treatment. The data upon which conclusions were based is shown in part in the accompanying tables.

In Table I-a, the seven instances in the first and second decades have been classified as pre-puberty hypertrophy because they occurred just before hat period. They have been included here because they differed from the normal puberty hypertrophy in that they were unilateral developments following trauma (Fig. 1). Three were in girls and four in boys. The male breasts were all excised except one, while the female breasts were treated by protection. All are well. The chief complaint was tenderness, the mere contact of the clothing often being quite distressing. To palpation there was a mass corresponding in size to the areola which resembled in shape a button and very frequently was pronounced cystic by the inexperienced examiner. The microscopic slides in the three specimens studied showed the picture of puberty hypertrophy (Figs. 2 and 3). In the four instances treated expectantly the affected breast gradually lost its tenderness but the enlargement remained, and, with the development of the opposite breast at puberty, no difference between the two could be made out.

In the eighth decade the one case is interesting in that it occurred in a male, followed trauma, was extremely tender, was button-like and semicystic to palpation, and the microscopic picture was that of puberty hypertrophy.[1]

On the whole, however, it appears that hypertrophy is a disorder of the ages 20 to 50, and more especially of the fourth and fifth decades. Marriage, pregnancy, or lactation seems to have little or no bearing, inasmuch as the ratio between instances of hypertrophy in single and married women is about equal

[1] Since this article went to press two other cases have been seen; one in a man of 25 and the other in a man of 46. In both cases the button-like tender, semicystic enlargement followed a severe blow by a hard, small object. These have not been excised and apparently are getting better without any treatment except non-interference.

Fig. 1. Prepuberty hypertrophy. Female, age 9½. Trauma at 6 years of age followed by enlargement and tenderness. Under observation since 8 years of age. No change in this breast, no enlargement or tenderness in opposite breast. No indications of approaching puberty.

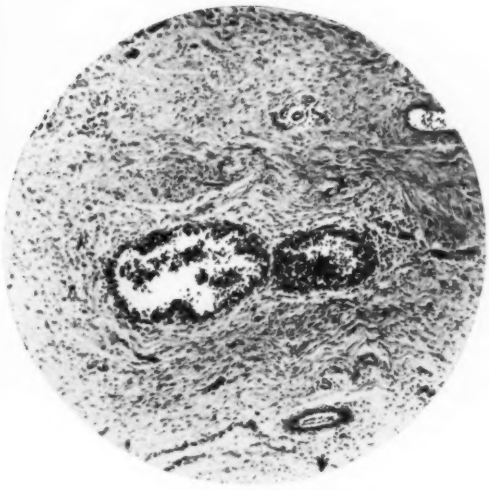

Fig. 2. S. P. 2394. Prepuberty hypertrophy. Scattered parenchymatous structures in the form of dilated ducts. Ductal epithelium is being desquamated. (The solid cords of epithelium are becoming hollow tubes?) Alveolar structures are lacking. A great overgrowth of rather dense connective tissue of the interlobular type accounts for the palpable enlargement. The intralobular connective tissue has not become differentiated. Boy, age 10.

to the ratio between virgins and married women between the ages of 20 and 50. The same comparison holds true as regards virginity and pregnancy. It is also evident that hypertrophy is a condition of the active sexual cycle and not a senile perversion of normal atrophy.

In Table I-b, pain is shown to be a nearly constant factor, while the unilateral and localized mass predominates in the proportion 5 to 3. The etiological factor, when traceable, was not primarily a localized affair, since direct trauma was demonstrated but 30 times out of 91, the prepuberty hypertrophies being included. The most common factors were constipation and worry, the latter, of course, being capable of leading to all kinds of physical upsets. Among the last 35 cases seen 25 gave evidence of a constitutional upset as a cause for the breast disturbance and in only three instances was there a history of an approaching menopause as the only factor.

In Table II-a and -b, the grouping or classification used was adopted for no other reason than that it was a convenient form of histological subdivision, and was not based upon the clinical picture, the type of treatment employed and the ultimate outcome, because these are alike in all instances. In the study of the 68 cases in which histological material was available a participation on the part of all the elements making up the breast was demonstrable, but, as a rule, either the parenchyma or the connective tissue (Fig. 4), predominated. The parenchymatous type showed two distinct forms, viz., the adenomatous, in which there was an increase in the number and size of the breast islands giving the picture quite like that of the early prefunctioning stage of lactation (Fig. 5, 6, 7) and the ectatic or dilatation type resembling the lactating breast in its various stages of involution (Fig. 8, 9, 10, 11, 12). Grossly the picture varied, but there was always demonstrable one or more areas which contrasted sharply with the rest of the breast in that there was thickening, or increased density, or firmer consistency, or presence of cysts. In cases where the whole gland was affected the quantity of non-fatty breast substance was

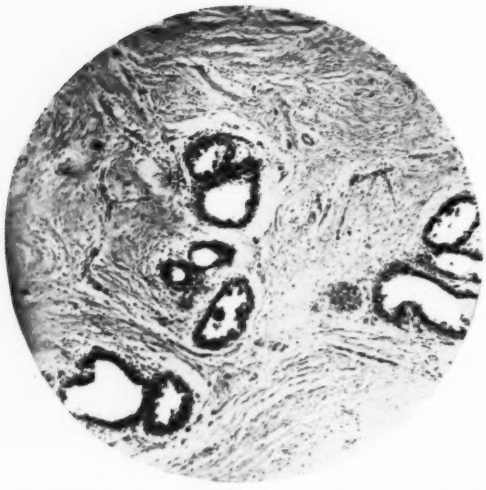

Fig. 3. S. P. 2341. Similar to Figure 2 except for more pronounced dilatation of ducts and absence of desquamated cells. Boy, age 12.

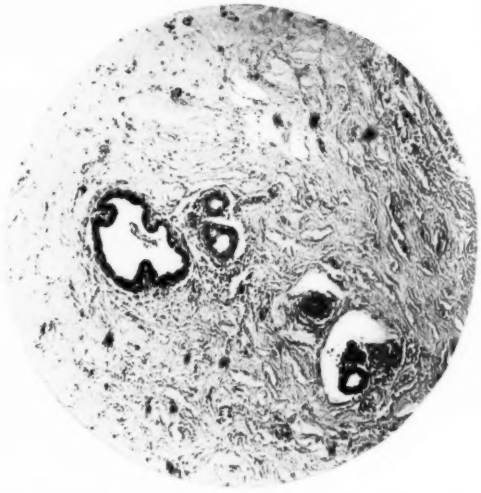

Fig. 4. S. P. 2796. Connective tissue type. Virgin, age 18. Tender lump. (The space about the duct at the extreme right is an artifact.)

very notably increased over that in the average breast. In the subdivision "without cysts" occasionally the ducts were very greatly distended with a creamy or soft putty-like material which oozed forth upon section.

The figures show that the ectatic form of the parenchymatous type predominates, while the

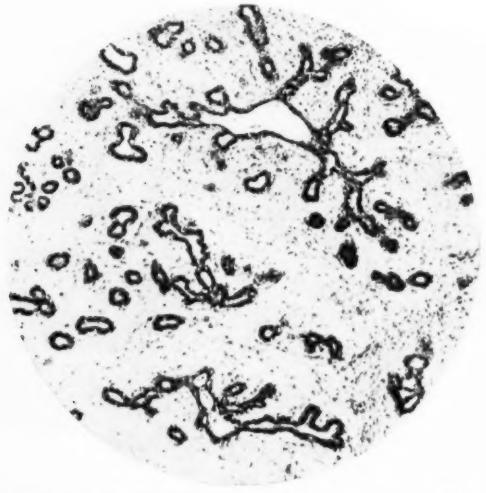

Fig. 5. S. P. 23.814. Early or prelactation hypertrophy. Ducts and alveoli increased. Number of breast lobules increased. Corresponding growth of intralobular connective tissue. Primipara, 2 months pregnant. Pregnancy undisturbed.

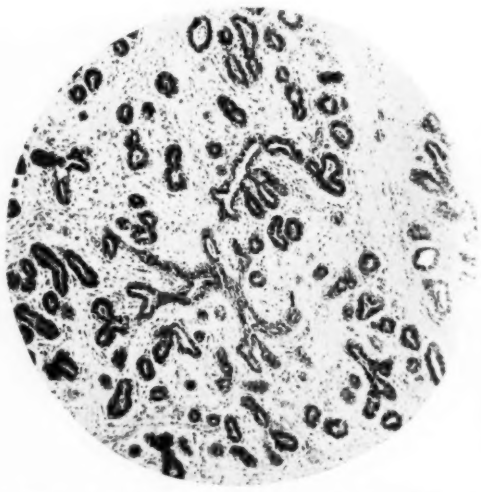

Fig. 6. S. P. 20.72. Adenomatous type of breast hypertrophy simulating microscopically prelactation hypertrophy. Increase in number of ducts, of alveoli, of breast lobules. Married woman, never pregnant, never lactated. Single questionable lump without symptoms.

TABLE I-A—INCIDENCE OF HYPERTROPHY IN RELATION TO AGE, SEXUAL CYCLE, MARITAL STATE, PREGNANCIES, AND ETIOLOGICAL FACTORS

Age by decades	Number of Cases
First decade	1
Second decade	6
Third decade	18
Fourth decade	39
Fifth decade	35
Sixth decade	9
Seventh decade	2
Eighth decade	1
Decade not known	14
Total	125
Sexual cycle	
Prepuberty	7
Puberty to menopause	83
After menopause	7
Cycle unknown	28
Marital state	
Single	25
Married	90
Before sexual maturity	7
State unknown	3
Pregnancy	
No pregnancy	36
With lactation	42
Without lactation	7
Unknown	40
Etiological factors	
Trauma	30
Worry, mental load	31
Female trouble	9
Gastric—intestinal	37
No factor	14
Factor unknown	30

Among the etiological factors there is great overlapping. Constipation, which was the most common finding, was very frequently combined with nervous or mental strain, and most of the traumatized breasts which remained tender were in women who were suffering from nervous, pelvic, or digestive disturbances. Ovarian or uterine disease, as the only possible etiological factor, was rare.

TABLE I-B.—SUBJECTIVE SYMPTOMS AND OBJECTIVE FINDINGS

Subjective symptoms	Number of Cases	
Tenderness		25
Pain		22
Pain and tenderness		42
None		16
Unknown		20
Total		125
Objective findings		
Unilateral	84	
Bilateral	41	
		125
General	52	
Localized	73	125

Pain or tenderness was present in 84.7 per cent of cases in which records of subjective symptoms were made; 32.8 per cent were bilateral and 41.6 per cent were general. This means that the combination of pain or tenderness and multiplicity is present in about 50 per cent of the hypertrophies.

subdivision "with large cysts" (1 centimeter or over) is in the lead. This situation might be explained by the fact that cysts in the past have been considered surgical or that the cysts have been confused with solid tumors which require surgery. The nearly equal number in the group "without large cysts," however, can be taken as an indication that there is actually a predominance of the ectatic type especially since there is no difference subjectively or objectively between this form and the pure adenomatous and connective-tissue types. Furthermore, the ectatic type predominates in the hypertrophies of the virginal breasts and in view of McFarland's monograph (1) the figures are interesting. Out of 68 cases which were studied histologically 15 were in unmarried women, and 11 showed ectasia, while out of 9 instances, in which the virginal state was admitted, 6 breasts showed the ectatic type, or "residual lactation acini."

Table III records the type of histological picture in the breast proper where all or a portion of the gland was taken in the removal of the breast tumor. It shows that exactly the same histological pictures which have been demonstrated in the various hypertrophies were found in breasts that were normal clinically and grossly except for the presence of tumor. It is also interesting to note that no type of histological picture predominated in conjunction with either cancer or with benign tumor.

The tables which show the type of treatment and the ultimate result are not recorded because all the patients traced, with one or two exceptions, are free of subjective symptoms and consider themselves well regardless of the therapeutic agents employed. Among the non-operative some experienced disappearance of their lumps, some saw a decrease in the size of the lumps or the whole glands, while all became free of tenderness or pain. There has been a steady increase in the cases treated medically showing that with experience more and more can be recognized

TABLE II-A AND II-B.—HISTOLOGICAL PICTURES IN SIXTY-EIGHT CASES OF BREAST HYPERTROPHY

	Total No. Cases	With large cysts	Without large cysts	Connective tissue	Adenomatous	Fatty	Mixed
1st decade...	0						
2nd decade..	1				1		
3rd decade...	6		2	2	2		
4th decade...	20	10	4	4	1	1	
5th decade...	21	13	6		2		
6th decade...	4		4				
7th decade...	1		1				
8th decade...	1				1		
?.....	14	3	3	2	3		3
Total.....	68	26	20	8	10	1	3
Married.....	48	20	14	4	7	1	2
Single.....	15	5	6	2	2		
?.....	5	1		2	1		1
Prepub.....	1				1		
Pub.-Meno..	35	16	9	5	4	1	
Post Meno...	3	1	2				
?.....	29	9	9	3	5		3
No Preg.....	25	11	5	3	5		1
Lactation....	17	7	6	1	2	1	
Without L...	2		1	1			
?.....	24	8	8	3	3		2
Unilateral...	53	22	15	7	6		3
Bilateral....	15	4	5	1	4	1	
General.....	20	2	7	4	4	1	2
Local.....	48	24	13	4	6		1
Pain.....	29	13	10	2	3		1
Tenderness..	19	8	5	3	3		
?.....	20	5	5	3	4	1	2

Table showing the relative frequency of the three main types of hypertrophy. The adenomatous type resembles microscopically the parenchymatous hypertrophy which begins at conception and continues until the uterus is emptied. The ectatic type with or without large cysts resembles microscopically the functioning breast or involution after lactation. The connective tissue type shows an overgrowth of the interlobular connective tissue, associated with a marked relative diminution in secreting elements.

TABLE III.—STUDY OF THE BREAST PROPER IN 163 CASES OUT OF 200 OPERATED UPON FOR BREAST TUMOR

	Benign	Malignant
Normal breast.....	10	9
Atrophy.....	7	50
Hypertrophy—connective tissue.....	1	7
Adenomatous.....	7	11
Ectatic with large cysts.....	1	5
Ectatic without large cysts.....	6	44
Mixed.....	1	4

This table refers to the microscopic picture only and does not mean that there was a gross hypertrophy, for instance, in the breasts removed. Such was sometimes the case, but usually any change from what may be considered normal was not suspected until the tissues were studied under the microscope. This would suggest that gross enlargement and subjective symptoms are the only differences between the normal breast and the conditions listed under the hypertrophies.

by their clinical manifestations alone. Thus among the first 50 cases 46 were operated upon either for the purpose of making a diagnosis or on a mistaken diagnosis, while among the second 50, 16 were operated upon and out of the last 20 only 1 came to surgery.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis is based upon four points, viz., pain, multiplicity, position of the lump, and shape of the lump.

1. *Pain.* When the patient comes to the physician on account of pain, he may rightly suspect that the condition is benign, especially if the pain is the initial symptom and the predominating factor. Hypertrophies and benign tumors are very frequently tender or even painful, while cancer is never tender, except in the presence of ulceration, and is painful only in the later stages when the positive signs of malignancy are present. The pain or tenderness of hypertrophies or of the benign tumors cannot be accurately differentiated, but a hypertrophy usually gives constant tenderness, sometimes varying in degree from day to day, while benign tumors are more likely to be painful or tender only at the periods. In approximately 90 per cent of the hypertrophies, the chief complaint was tenderness in at least one of the areas of thickening while former studies have shown that pain or tenderness is present in about 50 per cent of the benign tumors (2). On the other hand in the one instance in which a patient with cancer came to the doctor because of pain as the original and predominating symptom, there was a slight dimpling of the skin giving the positive clinical picture of cancer, and on examination of the specimen removed by complete operation, there was revealed a pronounced general connective-tissue hypertrophy which explained the tenderness.

2. *Multiplicity.* The finding of more than one lump practically rules out cancer inasmuch as cancer is very rarely multiple and when there is more than one malignancy in a breast or a cancer in each breast the positive evidence, such as skin or nipple change, is invariably present. Multiplicity, on the other hand, is very common in hypertrophies and is noted in about 20 per cent of benign tumors

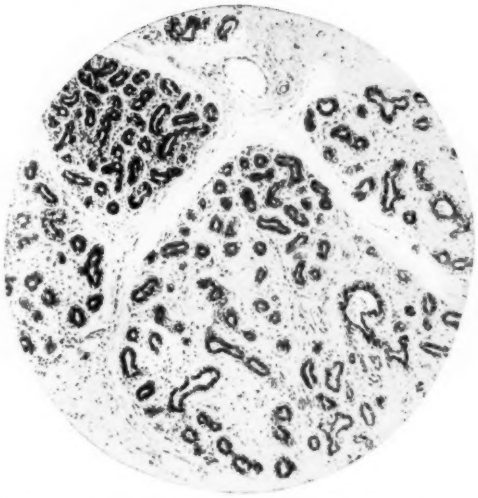

Fig. 7. S. P. 22.476. Adenomatous type of breast hypertrophy. Compare with Figure 6.

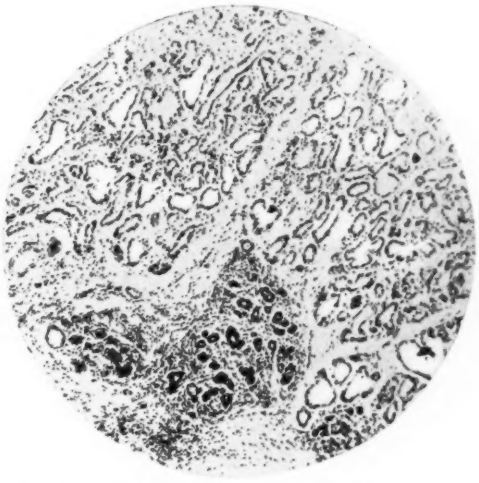

Fig. 8. S. P. 23.265. Typical lactation hypertrophy. Breast has been nursed 5 months. Note the two breast lobules at the bottom which are not functioning. In other areas alveoli and ducts are greatly dilated with secretion.

(2). More than one lump, therefore, invariably means hypertrophy or benign tumor, that is, solid areas of breast gland thickening, or multiple cysts, or multiple benign solid tumors.

3. *Position of the lump.* All lumps in the breast are either buried or superficial, that is, they are located between the planes of the under and outer surfaces of the gland or they project, more or less, beyond these planes toward the chest wall or toward the skin. All cancers are buried, while perhaps 95 per cent of benign solid tumors are superficial. The hypertrophies may be either definitely buried or questionably superficial. In palpating, therefore, if the lump is distinctly buried it is either cancer or a cyst or a solid hypertrophy. If it is a cyst there may be fluctuation; or there may be a flat or perhaps a very slightly dome shaped smooth spot on one side never found in cancer but very frequently seen in cysts; or perhaps there may be a mass too great for a cancer without skin or nipple changes. If the mass is superficial, it is either a benign tumor or an hypertrophy of the solid type. If the lump is a benign tumor it will be definitely spherical with a relatively narrow base of attachment, or its spherical nature will be unquestionably evident by the palpation of a firm, dome-like projection. On the other hand, a superficial hypertrophic mass is very frequently finger-like, that is, it projects from the surface with a broad base of attachment and is thickest at the base.

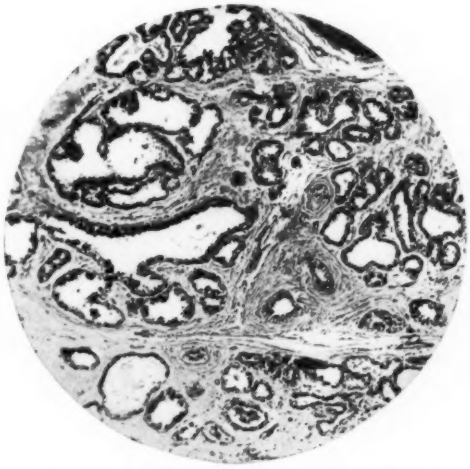

Fig. 9. S. P. 2359. Early involution following short period of lactation. Child 5 months old nursed 4 months. Note great dilatation with buckling of the walls and degenerative swelling of the lining cells. Operation for local excision of benign tumor.

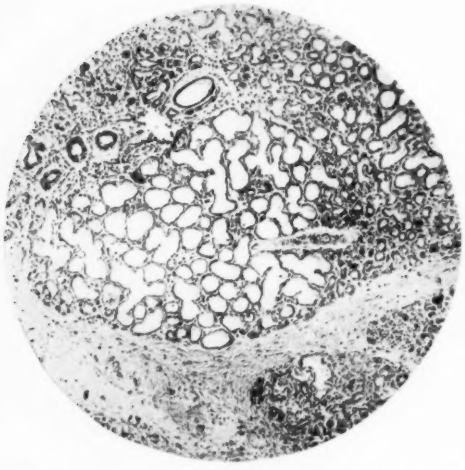

Fig. 10. S. P. 23.138. Early involution. Child 3 months old not allowed to nurse. Three other children each nursed 1 month. Breast removed for carcinoma.

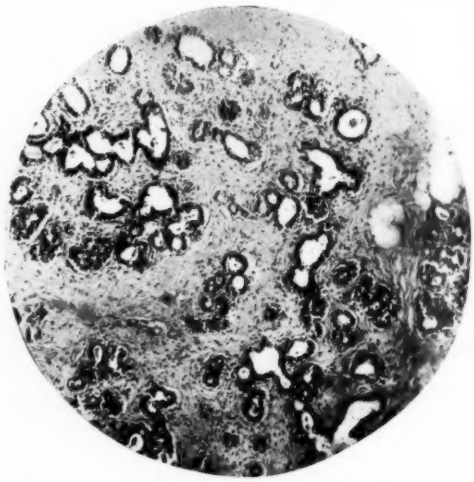

Fig. 11. S. P. 574. Ectatic type breast hypertrophy simulating lactation hypertrophy or involution. Note dilatation of ducts and alveoli and degenerative swelling of lining cells, sometimes distinguishable microscopically from true involution by the absence of intralobular connective tissue and by the presence of fat (upper right corner). Single buried mass—tender.

Hypertrophy frequently involves the whole lobulus from nipple to periphery giving a radiating indian-club-shaped mass and when more than one lobulus is affected a quadrant or the whole breast may be thickened. Such enlargements are never confusing, but rather it is the localized mass, involving less than a lobulus that may require close study. Thus a localized mass in the middle of a lobulus or at the nipple end usually is either a large cyst or a cancer and very seldom is solid hypertrophy. (Rarely is one still in doubt at this stage of differentiation in the presence of a benign solid tumor involving the ducts of the nipple region.) A mass in the distal third of a lobulus, however, may be either cancer, cyst, or solid hypertrophy, and then one must rely entirely upon the shape of the mass for the differentiation.

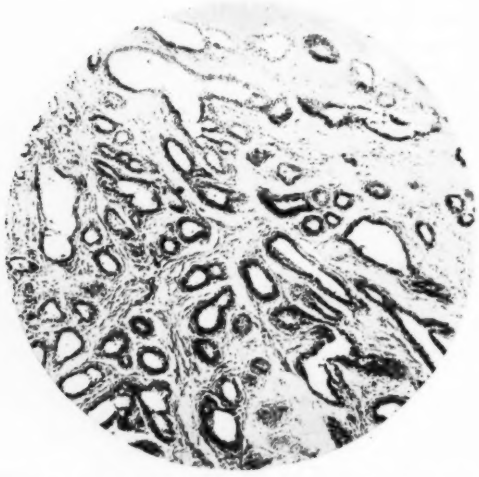

Fig. 12. S. P. 2540. Ectatic type of breast hypertrophy simulating lactation hypertrophy or involution. Compare with Figure 11. Single lump—tender. Virgin, age 42. Large cysts elsewhere in the breast.

4. Shape of the lump. An hypertrophy, almost without exception, follows the form of the breast gland in that there can be made out the irregularities as regards projections and crevices of the lobule or lobulus. Not infrequently the enlargement is proportionate in all directions and the result is, therefore, a flattened and often a pancake-like mass. In such cases the thickness is equal throughout the whole width of the mass, or the variations in thickness can be demonstrated to be due to superficial projection. On the other hand a buried mass, harboring a cancer or a

cyst in its midst, invariably is thicker at the middle point, giving the impression of a sphere or some sort of a mass surrounded by an envelop of breast tissue.

In the absence of pain or tenderness and multiplicity approximately 25 per cent of the buried tumors must be explored in order to determine the cystic (cyst) or solid (cancer) nature or to prove that the cyst is not associated with cancer.

SUMMARY

1. Breast hypertrophy is a clinical entity with a variety of histological pictures.

2. It is evidenced by an enlargement in the form of a lump involving a part of a lobule, a whole lobule, two or more lobules, a quadrant, a hemisphere, or the whole breast. Not infrequently there are multiple lumps in both breasts each involving a small portion of a lobule.

3. The histological picture simulates that of the normal breast in the various stages of puberty hypertrophy, pre-lactation, or lactation hypertrophy, post lactation involution, or atrophy.

4. Breast hypertrophy is not a new-growth and not a precancerous process inasmuch as the same histological pictures, minus the gross hypertrophy, may be seen in breasts that are normal.

5. It can be recognized by the clinical picture and without the aid of the exploratory incision.

6. It is not a local disease but a symptom of a disturbance which is located elsewhere in the body.

7. The treatment is medical, not surgical, and is directed toward the cause rather than the local manifestation.

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DEPARTMENT OF TECHNIQUE

LOCAL ANÆSTHESIA IN OPERATIONS ON THE NECK

A New Method of Cervical Plexus Block[1]

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If local anæsthesia is to be employed in a given operation, the operation field may be rendered anæsthetic by terminal infiltration field block, or nerve block. The best method depends on the location and anatomical relationships of the region involved, and the character and extent of the operative work. If the area to be anæsthetized is small, it is simpler, as a rule, to infiltrate than to block. When infiltration methods are employed, it is often necessary to continue the injections during the operation, unless the field of operation is small and superficial. In such cases the injected solution causes distortion of the operative site, and much of the anæsthetic medium escapes when the œdematized tissues are incised, or it is sponged up during the course of the operation. Infiltration methods should not be employed in septic fields, malignant tissues, and areas of greatly lowered vitality, because of the possible spread of infection or dissemination of malignant cells, and because of the occasional interference with healing.

If local anæsthesia is to be induced as a preliminary procedure, entirely distinct from the operation, regional methods, nerve block and field block, are best employed. Also if the extent of the operation is not clearly defined, block methods are more appropriate. In such cases the anæsthesia may be induced in a separate room by one especially skilled in this branch of work, and successive operations can be performed without loss of the operator's time. Success in blocking requires not only an accurate knowledge of the topographic anatomy, but also of the physiology of the nerve trunks of the region. Certain areas are easily blocked, owing to the accessibility of the nerve trunks supplying them, while others, for the opposite reason, must be anæsthetized by terminal infiltration.

The practical value of local anæsthesia is, therefore, not the same in all parts of the body; it is especially suitable for operations on the neck. The small operative field, the absence of cavities, the presence of definite tissue planes, and the constant relationship of the nerve trunks to palpable bony landmarks, all make this region adaptable to both terminal infiltration and nerve block methods of anæsthesia. In cases of superficial or well circumscribed lesions, the simpler infiltration method is more applicable. A similar superficial anæsthesia is also produced by infiltration of the terminal branches of the cervical nerves by subfascial injections at the posterior border of the sternocleidomastoid muscles; but in order to obtain a deeper anæsthesia the nerves must be reached at their emergence from the spinal column on a level with the transverse processes of the second, third, and fourth cervical vertebræ.

NERVES OF THE NECK

The sensory innervation of the neck from chin to manubrium and from mastoid process to acromion, is supplied by the branches of the cervical plexus, which is formed by the anterior primary divisions of the four upper cervical nerves. After traversing the intervertebral foramina, they pass behind the intervertebral artery, then lie in the sulci of the transverse processes provided for this purpose. The first then emerges between the rectus capitis lateralis and the rectus capitis anterior minor muscles, and the others between the intertransversalis muscles, and then between the rectus capitis anterior major and scalenus medius muscles. The second, third, and fourth nerves each divide into an ascending and a descending branch (the first does not divide). These branches are then connected in a series of loops constituting the cervical plexus, which lies

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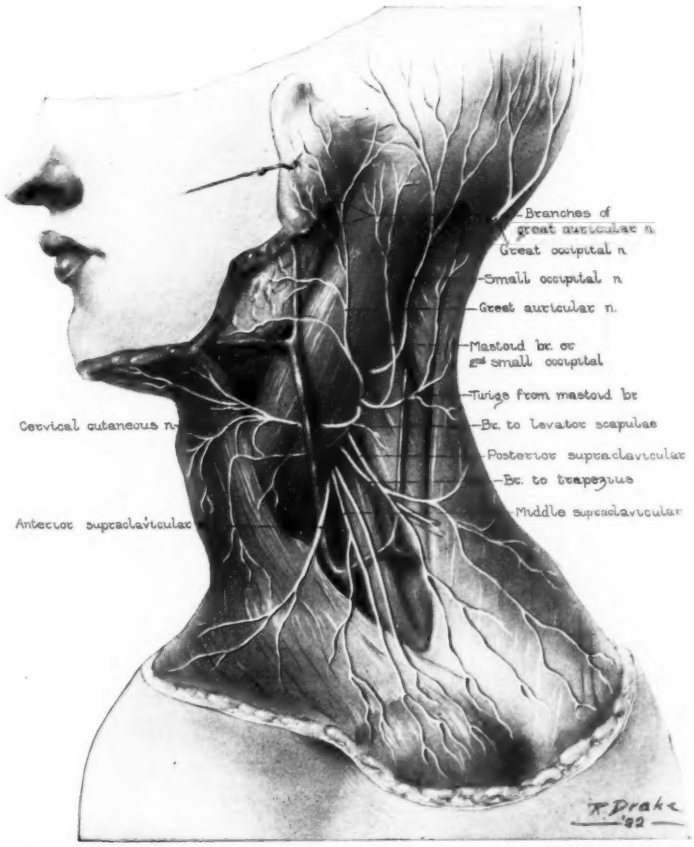

Fig. 1. Distribution of the superficial branches of the left cervical plexus. (Modified from Spalteholz.)

opposite the first four cervical vertebræ and on the scalenus and levator anguli scapulæ muscles, and is covered by the sternocleidomastoid muscle. From this series of loops, superficial and deep cervical branches are given off (Fig. 1). The superficial branches are purely sensory, consisting of the occipitalis minor, the auricularis magnus, the cutaneous colli, and the supraclaviculares. The posterior primary divisions supply the posterior structures of the neck and head, and give off cutaneous branches which run obliquely downward and outward overlapping the upper region of the back supplied by the thoracic nerves (Fig. 2).

The deep branches are divided into external and internal groups. Both arise beneath the sternomastoid, the former passing away from the median line of the neck, and the latter toward it. These branches are largely muscular and communicate to the deep structures of the lateral and anterior regions of the neck. They form the phrenic nerve also, and contribute to form the ansa hypoglossi.

CERVICAL PLEXUS BLOCK

The superficial branches of the plexus may be blocked by subfascial fanwise injections along the posterior margin of the sternocleidomastoid muscle at about its middle point. The deep, as well as the superficial branches, may be anæsthetized, however, by paravertebral injections. In the latter procedure the anæsthetic solution must be injected in immediate proximity to the transverse processes of the cervical vertebræ (5). The

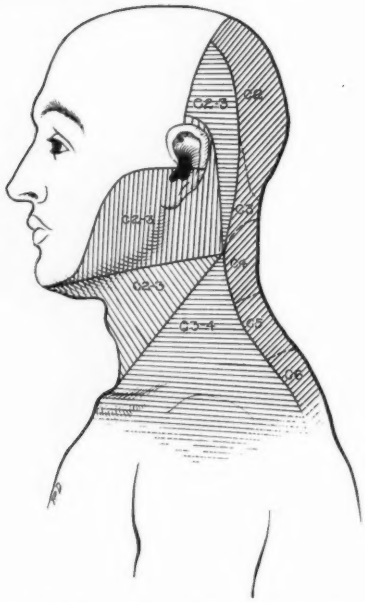

Fig. 2. Cutaneous anæsthesia resulting from paravertebral injections of the cervical plexus. (Modified from Cunningham.)

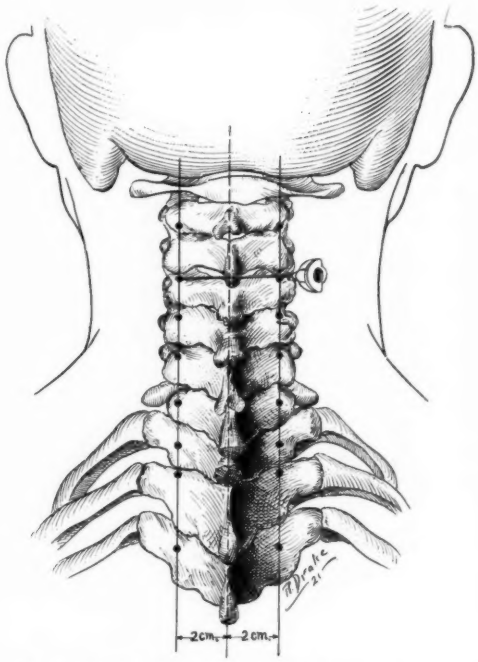

Fig. 3. Cervical plexus block, posterior route. (Modified from Pauchet.)

plexus may be approached by either posterior or lateral routes.

Block by the posterior route. Block of the cervical plexus by the posterior route was first proposed by Kappis, and the method was further elaborated and more thoroughly described by Danis. With the patient lying in the ventral decubitus position as for laminectomy, the chest is raised by cushions so that the head bends toward the sternum, thus making bony landmarks more easily palpable. The spinous processes are then defined and dermal wheals raised opposite the second, third, and fourth processes about 2 centimeters from the middle line (Fig. 3). These points may be carried lower, if necessary, as in laminectomy. A needle is advanced through each wheal in a direction parallel to the median longitudinal plane of the body until its point impinges on the lateral masses of the vertebræ. It is withdrawn and reinserted a little more obliquely outward, and as the previous depth is reached it may often be felt to glide past the lateral masses, after which it is advanced from 1 to 1.5 centimeters deeper. At this point an injection of from 5 to 8 centimeters of a 1 per cent procaine-adrenalin solution is made, while the needle is moved slightly to and fro (Fig. 4).

The principal drawback of this route is its anatomical inaccuracy. The procedure is consequently a failure in many operations, especially those on the anterior aspect of the neck, and is therefore rarely employed. Advantages claimed for it are that there is no danger that the needle will penetrate an intertransverse space and thus wound the vertebral artery, or puncture the dura. By advancing the needle too far, however, the jugular vein or carotid artery may be injured. The depth to which the needle must be advanced after bony contact with the lateral masses varies in different cases, so that a considerable portion of the solution is distributed too far from the nerve trunks and none is deposited as close to the tips of the transverse processes as by the lateral methods; thus anæsthesia produced by the latter procedures is more efficient. The lateral route is used in operations on the lateral and anterior portions of the neck, the posterior method being employed only in cervical laminectomy.

The lateral direct route. This method of blocking the cervical plexus (Heidenhain-Braun) has been rather extensively employed by most surgeons who use local anæsthesia in operating. The

needle is advanced from the side directly on the transverse processes in a plane parallel to the cervical column. The superficial landmarks are much more reliable than those of the back of the neck. With the patient lying on his back and head tilted somewhat away from the operator, the tip of the mastoid process and carotid tubercle are palpated. The mastoid-carotid line connecting these two points, lies over the cervical transverse processes (Fig. 5). The carotid tubercle may not be palpable, in which case the row of transverse processes may be recognized by rolling the tissues around, and at the same time exerting gentle pressure. A dermal wheal is raised at point *a*, (Fig. 6) a finger's breadth below the mastoid process which is ordinarily on a level with the angle of the jaw. Another wheal is located on the line connecting mastoid process and carotid tubercle, and on a level with the superior cornu of the thyroid cartilage. Through these two wheals needles are advanced until contact is taken with transverse processes, at which from 5 to 8 cubic centimeters of a 1 per cent solution is injected. The transverse processes of the third, fourth, and fifth cervical vertebræ are usually located through wheal *b*, and of the second through wheal *a*. Besides blocking of both sides, solution is distributed subfascially and subcutaneously in the same plane. The quantity of solution need never exceed 20 cubic centimeters for the deep injections and 15 cubic centimeters for the superficial infiltration on each side, or a total of 70 cubic centimeters of a 1 per cent solution. A single puncture is sometimes made at the posterior margin of the sternomastoid muscle near its middle point and 1.5 centimeters behind the external jugular vein. Fanwise injections are made from this point as deep as the transverse processes.

Block of the cervical plexus by the lateral direct route has been rather extensively employed during recent years in most surgical conditions of the neck, and this vast clinical experience has shown that the method is not without an element of danger (8, 35, 9). The needle must not be advanced between transverse processes because of possible injury to the vertebral vessels or intravascular injections. Spinal puncture, with consequent injury of the cord and intraspinal injection of the solution at this level, would also cause sudden and alarming symptoms.

The cervical transverse processes are rather thin and afford a poor surface of contact for the needle point; intertransverse spaces are much wider. Since the transverse processes curve somewhat downward, intraspinal puncture is more likely to occur when needle is advanced upward (Fig. 9). Even for stout patients a 3.5 centimeter needle is of sufficient length for paravertebral anæsthesia of cervical region, if the needle is advanced directly onto the transverse processes.

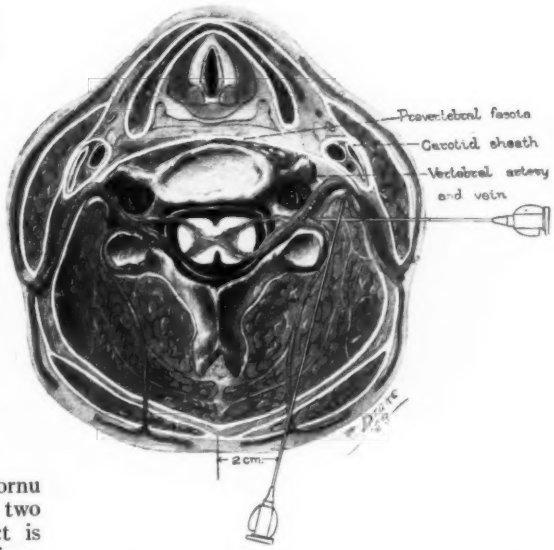

Fig. 4. Cross section through the neck at the level of the fourth cervical vertebra, showing position of the needles in the posterior and lateral direct methods. Schematic distribution of the fourth cervical nerve is shown and fascial planes of the neck are represented diagrammatically.

In early attempts at cervical plexus block the method was limited to one side only, for fear of possible ill effects from bilateral block of the vgaus or phrenic nerves Wide clinical experience with bilateral plexus block, however, does not indicate functional disturbances attributable to block of these nerves. It seems probable that the prevertebral fascia, and that of the carotid sheath (Fig. 4) may serve as barriers to the diffusion of anæsthetic solution to the vagus nerves sufficient to prevent block. When the injections are made close to the transverse processes, however, it is reasonable to believe that there is usually physiological block of both phrenic nerves since they arise principally from the third, fourth, and sometimes fifth cervical segments and are not protected by fascial planes. In a study to determine the mechanism of occasional untoward results with cervical paravertebral injections, Wiemann blocked the plexus on one side, then observed the movements of the diaphragm with

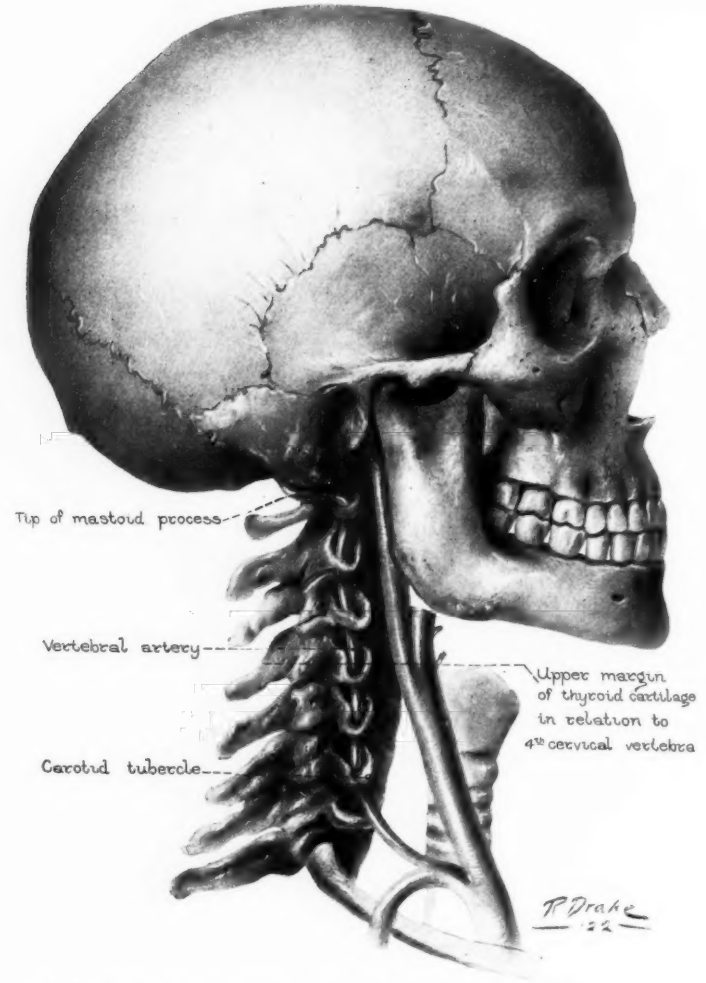
Tip of mastoid process
Vertebral artery
Upper margin of thyroid cartilage in relation to 4th cervical vertebra
Carotid tubercle
T Drake

Fig. 5. Lateral view of cervical vertebræ showing the relation of transverse processes to the tip of the mastoid process, and the carotid tubercle. (Modified from Campbell.)

the fluoroscope. He found limited motion on the blocked side but without any subjective disturbances. Even with partial to complete temporary inhibition of the phrenic nerves, the lower intercostals to the diaphragm prevent complete paralysis, and the accessory muscles of respiration compensate for any functional deficiency of the diaphragm.

Epileptiform seizures and collapse may be untoward results, and two cases of sudden death have been reported, which may have been caused by paravertebral anæsthesia. Holm reports a case of sudden convulsive seizures and collapse while blocking the cervical plexus. The patient revived gradually within 2 hours, and 3 days later thyroidectomy was performed under ether anæsthesia without incident. Meyer reports two similar cases in which both of the patients recovered, and Hering mentions two cases in which alarming symptoms developed, neither of which were fatal.

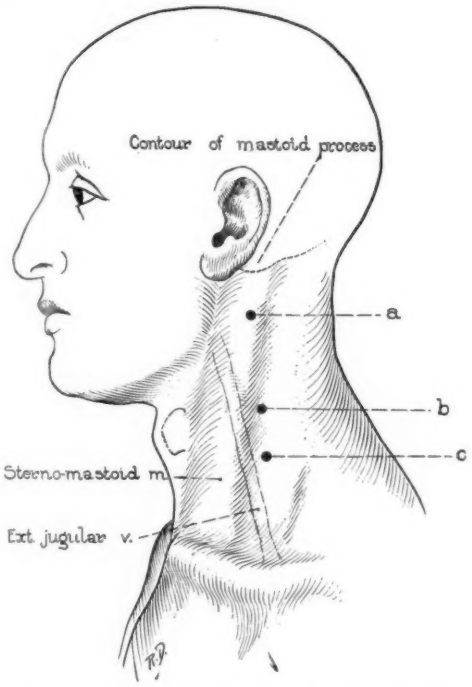

Fig. 6. Cervical plexus block by the lateral direct route. *a* and *b*, are points of injection; *c* marks the carotid tubercle.

Bruett describes a fatal case, death occurring during the performance of thyroidectomy. The injection of 140 cubic centimeters of a 0.5 per cent novocain-adrenalin solution was concluded without incident. Soon severe symptoms of collapse appeared and progressed to cessation of heart action and respiration. Artificial respiration and heart massage were of no avail. A similar fatal case is reported by Wiemann, in which 14 cubic centimeters of a 1 per cent and 20 cubic centimeters of 0.5 per cent novocain-adrenalin solution were employed in bilateral cervical plexus block. At necropsy, status thymicolymphaticus was discovered, and hæmatomata from injection on both sides of the neck which were thought to have interfered with vagus function. Winterstein reports a case of bilateral cervical plexus block for thyroidectomy in which rapid symptoms of collapse occurred. Complete paralysis of the left arm and slight facial paralysis persisted for 6 months. He ascribes these ill effects to puncture of the dura through an intervertebral foramen and direct injury of the cord. It even appears possible that all these cases of collapse, as well as

Fig. 7. Position of patient and operator in cervical plexus block by the lateral oblique method.

the two fatalities may have been due to accidental intraspinal injection, since the character of symptoms, their onset and course are essentially the same as the untoward results sometimes seen in spinal anæsthesia.

Lateral oblique route. In order to prevent injury to the vertebral vessels, as well as puncture of the dura, we have performed cervical paravertebral nerve block by the lateral oblique method (25). In this technique the transverse processes are also approached through the lateral plane, but from above obliquely downward (Fig. 7). With the patient in the thyroidectomy position and with the head rotated somewhat away from the operator, the same landmarks are identified as in the lateral direct method. A dermal wheal is placed just below, and almost contiguous to the tip of the mastoid process. Infiltration is carried toward the carotid tubercle for a distance of 4 or 5 centimeters, or wheals *b* and *c* (Fig. 8) raised at distances of 1.5 centimeters apart in the mastoid-carotid line. The needle is inserted at the highest wheal and advanced obliquely downward at an angle of 45 degrees with the median plane of the body, while the line of transverse processes is palpated with the left hand. When bony contact is sensed, from 5 to 8 cubic centimeters of novocain-adrenalin solution is injected, the needle being slowly withdrawn as the injection is concluded. Similar injections are then made at the tips of the third and fourth cervical

Fig. 8. Cervical plexus block by the lateral oblique method. *a* mastoid wheal; *b* and *c* being located on the mastoid-carotid line 1 to 1.5 centimeters apart; *d* represents the carotid tubercle.

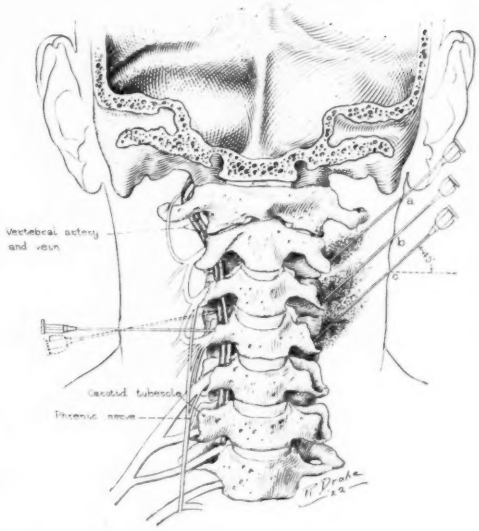

Fig. 9. Lateral routes of cervical plexus block. By the direct method, on the patient's right, the danger of entering interspaces and injuring the vertebral vessels or cord is shown. By the oblique method, patient's left, there is no danger of such an accident (stippled areas on the left represent injected fluid).

transverse processes from wheals *b* and *c*, respectively. Subfascial fanwise injections are made in the same plane in such a manner that, at completion, a wall of anæsthetic fluid extending from skin to transverse processes has been projected.

Of the two lateral methods, the oblique is to be preferred to the direct because of its greater anatomical safety. There is no possibility of entering the intertransverse space with the oblique direction, as there is when the lateral direct method is used, and the needle never enters the intertransverse space far enough to reach the vertebral vessels (Fig. 9). Within the last 2 years bilateral cervical plexus block by the lateral oblique method has been employed 272 times and unilateral block 34 times. Bilateral block has been employed in thyroidectomy, resection of cervical and submaxillary lymph glands, and excision of branchial cysts. It has also been useful in laryngectomy and thyrotomy together with block of the superior and inferior laryngeal nerves and deep infiltration of the submaxillary region. Unilateral block has been efficient in cases of œsophageal diverticula, as part of the procedure for osteoplastic flaps in brain surgery, and gasserian ganglion operations. There have been no convulsive seizures or collapse and no clinical manifestations of functional disturbances of the vagus or phrenic nerves.

LOCAL ANÆSTHESIA IN SURGERY OF THE THYROID GLAND

One of the most convincing proofs of the value of local anæsthesia in surgery of the neck is its advance in the favor of surgeons for the removal of goiter. Many surgeons attempt the use of local anæsthesia in all cases of thyroidectomy, even those of retrosternal extension. Within the last 5 years local anæsthesia in thyroidectomy at the Mayo Clinic has increased from 2.7 per cent to 29 per cent in cases of simple goiter (Fig. 10). The use of combined anæsthesia has shown a similar increase in popularity. In 1918, 2.3 per cent of thyroidectomies for simple goiter were performed under combined anæsthesia, while in 1922 the number had increased to 37 per cent. All anæsthetics were regarded as combined, in which local injections were supplemented by inhalation narcosis, either nitrous oxide-oxygen or ether. The inhalation narcosis was usually of short duration, the patient usually being conscious during closure of the wound. Inhalation narcosis was necessary more often when terminal infiltration alone was employed. If intolerable pain was experienced it was usually during delivery of the gland. Often inhalation anæsthetics were necessary for psychic reasons, in the absence of proper preliminary hypodermic narcosis. The absence of adrenalin in the anæsthetic solution was also occasionally responsible for ineffective local anæsthesia.

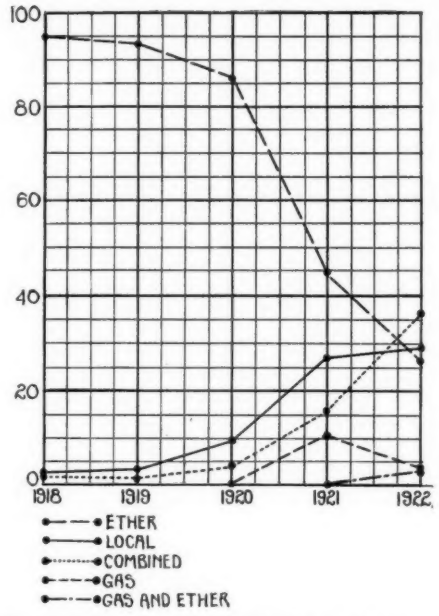

Fig. 10. Chart, showing anæsthetics employed in all thyroidectomies for simple goiter during the past 5 years.

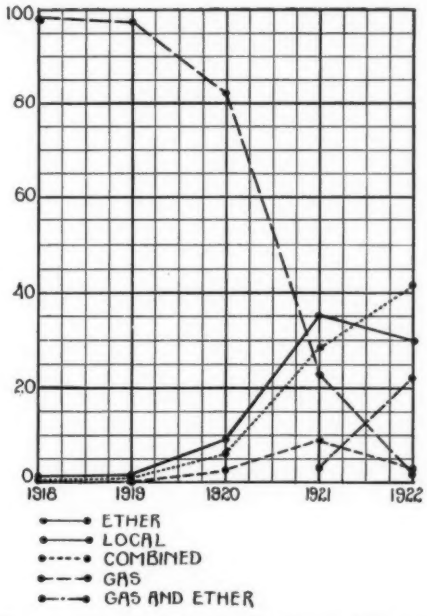

Fig. 11. Chart showing anæsthetics employed in all thyroidectomies for toxic goiter during the past five years.

Figure 11 shows the increasing usefulness of local anæsthesia also in thyroidectomy for toxic goiter. In 1918, local anæsthesia alone was employed in 1.4 per cent of cases, and combined with inhalation narcosis in 0.6 per cent. In 1922, these percentages had increased to 30 and 42 respectively. The employment of ether alone has decreased from 98 per cent in 1918 to 3 per cent in 1922. It should be noted, however, that nitrous oxide oxygen and ether were combined in 22 per cent of the toxic cases in 1922.

The benefit to the patient of local anæsthesia in surgery of the thyroid is indicated by the excellent results recently reported by Pemberton, C. H. Mayo, and Boothby for 1922. Aside from the general advantages attributed to the use of local anæsthesia, there are special advantages in thyroidectomy. If the patient is very ill either from intoxication or degeneration in essential organs, local anæsthetics properly handled exercise a more benign systemic effect than general. The heart is often badly involved in such cases and the strain on the kidneys is decidedly less with local anæsthesia. The risk of injury to the recurrent laryngeal nerve by inclusion within the grasp of forceps or ligatures is not so great. When such accidents occur they may be detected easily and corrected by the resulting disturbance in phonation. No temporary disturbance of the voice from anæsthetics has been observed, as when injections are made between the trachea and goiter. Hertzler asserts that having the patient cough forcibly, as advocated by German surgeons, in order to force the gland upward is very effective, while Farr maintains that intrathoracic goiters may be delivered by the patient in this manner.

Terminal infiltration is the method of local anæsthesia most commonly employed in thyroidectomy. Starting at one or two points in the middle line of the neck and from the most prominent point of the thyroid tumor, the line of incision is infiltrated along a curved line below the platysma on both sides as far as the sternocleidomastoid muscles, or even farther. The 0.5 per cent novocain-adrenalin solution is injected copiously from the proposed line of incision upward and downward into the subcutaneous tissues and often into the infrahyoid muscles, creating an anæsthetized zone generously covering the thyroid tumor on both sides. This infiltration enables the skin and platysma to be incised painlessly and reflected upward and downward, and often the infrahyoid muscles may be clamped,

Fig. 12. Anæsthetic technique in thyroidectomy. *a*, *b*, and *c*, Represent cervical plexus block by the lateral oblique method. From *d*, subcutaneous fanwise injections are made. This procedure is repeated on the opposite side.

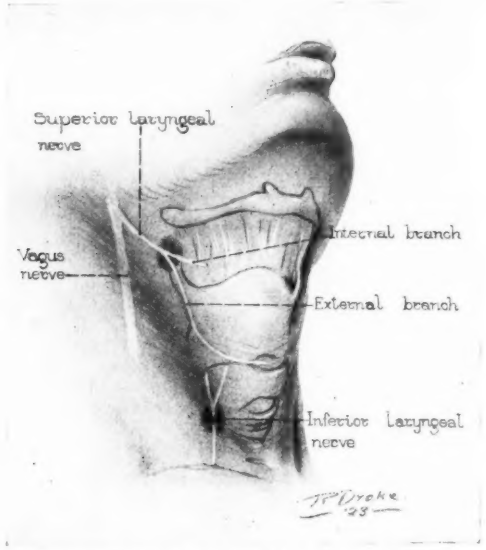

Fig. 13. Block of the superior and inferior laryngeal nerves. Stippled areas represent injected solution.

incised, and reflected without further injections. If there is distress, the muscles are infiltrated copiously before division. A wide exposure is necessary so that traction from freeing the tumor and lifting it out of the wound will be reduced to a minimum. Deep injections from the lower and upper poles of the tumor toward the trachea and larynx will usually control the pain from the traction necessary in delivering the gland.

Most authorities of wide experience in local anæsthesia problems recommend cervical plexus block at the posterior margins of the sternocleidomastoid muscles, the anatomical reasons for which are very apparent. Braun, Haertel, Farr, Pauchet, Labat, Allen, Hertzler, Hirschel, Smith, Danis, and others, all recommend block of the cervical plexus by the lateral direct route in thyroidectomy, because of the deeper anæsthesia afforded. When the anæsthesia is to be induced as a separate procedure before operation, and especially when the infrahyoid muscles are not divided, block of the cervical plexus should be employed more often. In such cases bilateral block of the cervical plexus by the lateral oblique method combined with infiltration at the line of incision, has been found safe and effective (Fig. 12). The plexus block gives better relaxation of the muscles of the neck and greater facility in the use of retractors. In such cases from 25 to 30 cubic centimeters of a 0.5 per cent solution for each plexus, and from 30 to 50 cubic centimeters for subcutaneous infiltration, are employed. In nontoxic cases 10 minims of adrenalin 1:1000 are added to each 100 cubic centimeters of solution. When a 1 per cent novocain solution is employed in the plexus block, subcutaneous infiltration is not necessary, although a longer period of waiting is required for the development of cutaneous anæsthesia. Usually in toxic goiter no adrenalin is employed; better anæsthesia results by the use of 1 per cent novocain.

Ligation of the thyroid vessels is ordinarily performed by local infiltration at the line of incision. This procedure is easily and quickly accomplished by distributing the solution subcutaneously and subfascially so as to expose painlessly the upper pole of the gland. If the deep manipulations are still painful, more anæsthetic fluid is injected on both sides of the pedicle before ligation. One-half per cent novocain solution is effective and may be used liberally without the addition of adrenalin.

LARYNX AND TRACHEA

Laryngectomy can be performed under local anæsthesia with greater ease than under general

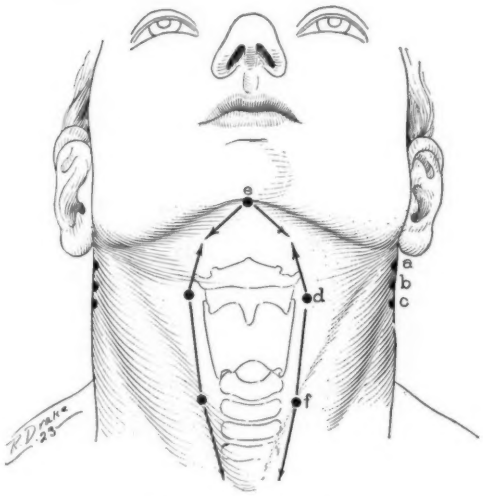

Fig. 14. Anæsthetic technique for laryngectomy. *a*, *b*, and *c*, Represent cervical plexus block by the lateral oblique method. At point *d*, the superior laryngeal nerves are blocked. From *d* and *e* the floor of the mouth is infiltrated by fanwise injections in the same plane.

Fig. 15. Anæsthetic technique for œsophageal diverticulum. *a*, *b*, *c* and *d*, Represent left cervical plexus block. In addition the operative field is encased with a wall of anæsthetic solution.

anæsthesia (13, 28). With local anæsthesia there is not the annoyance connected with the anæsthetic apparatus, tracheotomy tube and so forth, and the operation can proceed in a free field. The operative mortality, especially from shock and bronchopneumonia, may be considerably reduced. New, in 1917, reported a series of 15 cases of cartilaginous tumors of the larynx in which external operations, varying from complete laryngectomy to thyrotomy, and removal of the tumor, were performed; 5 patients died shortly after operation from pulmonary complications. Of a total of 9 thyrotomies performed during the last 2½ years at the Mayo Clinic, 6 were performed under local anæsthesia. During the same period four two-stage laryngectomies were performed entirely by this method. There was no postoperative mortality in the ten cases.

The nerves involved in laryngectomy are those of the cervical plexus described, and the superior and inferior laryngeal. The superior laryngeal nerve, mostly sensory, divides a little below the great cornu of the hyoid bone, and somewhat in front of that divides into external and internal branches (Fig. 13). The internal branch distributes to the mucosa of the larynx, the base of the tongue and the pharynx. The recurrent laryngeal nerve is chiefly motor to the intrinsic laryngeal musculature.

In blocking for laryngectomy the patient is placed in the same position as for thyroidectomy. Bilateral block of the cervical plexus is performed by the lateral oblique method (Fig. 14). Pressure with the index finger on the great cornu of the hyoid bone on the opposite side makes it more prominent on the side to be injected. A wheal *d* is then placed 1 centimeter below and 1 centimeter in front of the greater cornu. The needle is then inserted medially and posteriorly, and may be felt passing between the thyrohyoid muscle and the thyrohyoid membrane. At this point an injection of from 3 to 4 cubic centimeters of 1 per cent novocain solution is made. Twice the amount of a 0.5 per cent solution may be used, the needle being moved somewhat to and fro, or reinserted anew and the injection completed. From *d* and *e* the floor of the mouth is infiltrated by fanwise injections in the same plane. The infiltration is continued through point *f*. In most cases anæsthesia results in from 10 to 15 minutes, and if the technique has been properly followed, the anæsthesia will be sufficient for operations involving the vocal cords.

When the hyoid bone is to be divided, the injections are carried well up into the floor of the mouth and the submental region. Block of the recurrent laryngeal nerves is usually unnecessary, and when these nerves are injected it is best done during the course of the operation, unless there has been preliminary tracheotomy. Block of these nerves also produces paralysis of the intrinsic muscles of the larynx, which results in

dyspnœa. Certain authorities take the added precaution of inducing surface anæsthesia by direct applications to the laryngeal and pharyngeal mucosa. The thyrohyoid membrane may be perforated and 2 cubic centimeters of a 10 per cent cocaine solution instilled, drop by drop. The mucosa of the trachea may be anæsthetized by swabbing the mucous membrane with 10 per cent cocaine on an applicator. The tracheal mucosa may also be anæsthetized before opening by injections into its lumen. As soon as the trachea is laid bare, puncture may be made between two tracheal rings and from 5 to 15 drops of a 2.5 per cent cocaine solution slowly injected (34).

Anæsthesia is easily possible without block of the cervical plexus when it is necessary to inject around the whole larynx and upper trachea. Wheals are placed on either side of the larynx and trachea about 2 to 3 centimeters from the middle line, from which injections are made around the entire larynx. Deep injections are also carried well into the submaxillary region. If block of the superior laryngeal nerve is correctly carried out, the local application to the mucous membrane is hardly necessary.

Local infiltration is sufficient to produce anæsthesia in tracheotomy. The line of incision is first infiltrated, then the subcutaneous tissues, and the tissues around the trachea are injected by directing the needle laterally and posteriorly from the same line. By displacing the skin further laterally it is possible to infiltrate the space between trachea and œsophagus. In emergency cases infiltration along the line of incision is adequate.

DIVERTICULA OF THE ŒSOPHAGUS

The special advantage of local anæsthesia in operations for the removal of diverticula of the œsophagus consists first in the lessened danger of bronchopneumonia from aspiration of the contents of the sac. C. H. Mayo reports a case of pneumonia resulting from the contents of the sac pouring into the trachea under general anæsthesia. Bartlett suggests that the sac may be identified after dissection to the region of the diverticulum by having the patient distend the mouth and pharynx with air, thus distending the sac. The technique of producing the anæsthesia consists first in block of the left cervical plexus, usually carried down to the fifth and sixth cervical vertebra. Infiltration is then made to encase the operative field, as in Figure 15. If the sac is large and adherent, especially if it is intrathoracic, there may be intolerable pain in freeing and delivering it. The mucous membrane of the œsophagus is insensitive to pain, but moderately sensitive to heat and cold.

LYMPH GLANDS

Excision of small isolated and well defined groups of diseased lymph glands may be performed under circular infiltration. Care should be exercised not to make the injections into the substance of a gland which might cause its rupture, with liberation of infection. For the more extensive operations, as total extirpation of all lymphatic glands, and even of the submaxillary salivary gland following operations for carcinoma of the lower lip, block of the cervical plexus is the best technique.

After block of the plexus on both sides by the lateral oblique method, the operative field is circumscribed by subcutaneous injections along the posterior margin of the sternocleidomastoid muscle, above the clavicle and sternum, and into the floor of the mouth along the border of the lower jaw. If the submaxillary gland is to be removed also, injections are made well into the submaxillary space close to the medial border of the mandible. From 100 to 150 cubic centimeters of a 0.5 per cent solution will be required. Difficulty may be encountered in dealing with glands which are matted together or broken extensively. These may be located laterally in such a position as to make plexus block by the lateral methods a difficult procedure. In such cases the posterior method of approach may be employed to advantage.

MISCELLANEOUS

Other operations which may be performed to advantage under local anæsthesia are ligation of the carotid arteries, excision of a branchial or thyroglossal duct cyst or division of the sternocleidomastoid muscle in torticollis. For these procedures the cervical plexus may be blocked on one or both sides as needed. For the incision, excision or cauterization of furuncles and carbuncles of the neck, local anæsthetics are ill suited. The infected and inflamed tissues often extend over the entire lateral or posterior aspects of the neck. The neck is extremely sensitive and the infective process painful; often it is difficult to foretell the extent of suppuration. The region is swollen, and the neighboring tissues adherent, so that it hardly seems justified to penetrate such tissues with needles. In most cases, therefore, a short general anæsthetic for the cautery excision of furuncles and carbuncles is far more comfortable for the patient and more effective for the surgeon.

DISCUSSION

The efficacy of local anæsthesia in surgery of the neck has been repeatedly demonstrated and yet considerable difference of opinion exists among surgeons with regard to the proportion of such operations in which local anæsthesia is indicated. Many still regard local anæsthetic procedures with distrust, which can, in most cases, be attributed to unfamiliarity with the technique in all its phases. Probably indifference to the essentials, rather than ignorance of the essentials of proper technique in producing local anæsthesia and methods of handling the patients, has done more to retard progress in the use of local anæsthetics than all other factors. Certain obvious refinements in technique should always be observed, as, for example, raising an intradermal wheal with the finest hypodermic needle at a point where a coarser needle is to be introduced. Much less pain is produced by passing the longer needle through the tissues slowly, and by injecting the solution progressively as the needle advances.

As in all other surgical procedures, satisfactory work cannot be performed with unsuitable instruments. Many who have given local anæsthesia methods a trial, have used ordinary hypodermic syringes and needles, and uncertain solutions; injections have been made haphazardly, and the methods abandoned as unsatisfactory. An assortment of various sized, bright, sharp, flexible, steel needles of fine bore, and a smooth-running syringe, are necessary requisites for the painless execution of any local anæsthesia procedure. The many self-filling syringes, pneumatic injectors, and so forth, on the market today, have only served to make the technique more difficult. These machines are, in general, cumbersome, hard to sterilize, and get out of order very quickly. They represent a complex, clumsy apparatus for the performance of a simple task.

PREPARATION

Equally as important as skill in the induction of local anæsthesia is the proper preliminary preparation of the patient. Undoubtedly, the mental attitude of the patient has almost as much to do with the success of the operation as the anæsthesia (11). The co-operation of every person connected with the patient is necessary in order that he may go to the operating room in a confident and tranquil mood. Often a patient will anticipate trouble because a clerk or orderly has given advice as to the form of anæsthetic, ignorant of the harm being done. If, as the result of co-operation, an attitude of confidence has been created, the operation may be completed, even if the patient is neurotic, while he thinks he is undergoing the preliminary preparation of the operative field.

The terrors associated with the operating room and the unpleasant impressions made on the patient by everything connected with an operation, may be abolished or considerably diminished by the preliminary hypodermic administration of a narcotic drug. The amount given must be determined for the individual case and will vary according to the age, weight, temperament, and general resistance of the patient. Pantopon possesses advantages over morphine in that it is not as depressing to circulation or respiration, it is not often followed by nausea and vomiting, and it is equally as effective in the control of pain. Scopolamine hydrobromide in small amounts tends to produce an indifferent or sleepy mood. The administration of these two drugs together in proper amounts one-half hour before anæsthesia is induced, and repeated if necessary during anæsthesia at least 15 minutes before operation, is the best preliminary preparation. The patient's mind is sufficiently blunted to outside influences so that the operation will not cause further excitement, although the stage of "twilight-sleep" need not be reached. It is to be noted, however, that the general resistance of the patient is a factor in determining the advisability of preliminary narcotics, and that in poor surgical risks they are usually unnecessary. Narcotics may only serve to increase the operative risk if the patient's general condition renders him indifferent to his surroundings.

CONCLUSIONS

1. The neck is one of the most favorable regions of the body for performing operations under local anæsthesia. The anatomy of this region is such that either infiltration or regional methods (nerve block and field block) may be employed.

2. If anæsthesia sufficient for the conclusion of the operation is to be induced as a pre-operative procedure, regional methods are more frequently employed because of the deeper anæsthesia.

3. Block of the cervical plexus by the posterior route is employed in cervical laminectomy as part of the procedure in craniotomy for cerebellar explorations, and occasionally when there are contra-indications to the employment of the lateral routes.

4. Of the two lateral routes the oblique is preferable because of the greater anatomical safety.

5. Block of the cervical plexus by the lateral oblique method is valuable, either alone or combined with infiltration, in operations on the lateral and anterior regions of the neck.

6. Operations which may be satisfactorily performed under local anæsthesia include thyroidectomy, laryngectomy, thyrotomy, and removal of tumors, excision of œsophageal diverticula, removal of lymphatic glands, excision of branchial cysts, tracheotomy, ligation of thyroid or carotid vessels and cervical laminectomy.

7. For the excision of furuncles and carbuncles, extensive degenerating glands of the neck, and widely disseminated carcinomatous glands, general anæsthesia methods should be employed.

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RADIUM TREATMENT OF CARCINOMA OF THE ANTRUM[1]

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THE problem of treating malignant tumors of the maxillary antrum seems to have passed the stage of radical surgery. Numerous operations have been devised and performed. Depending on the boldness and skill of the surgeon conservative excision of the growth and radical resection of the upper jaw have been advocated. But an investigation of the results indicates that such efforts have failed to cure and in many instances have actually hastened a fatal termination. For example, Scudder (1) who is a very experienced operator, states that even the most painstaking surgery rarely succeeds, and that it is the exception rather than the rule to find cured cases with authenticated laboratory reports. Bloodgood (2), more recently, was unable to find in his records of 30 years one solitary case of proven carcinoma of the antrum, cured by excision of the upper jaw. This persuaded him to replace the cutting operation by the cautery, by which method one patient has been made free of disease for 5 years. Martens (quoted by Scudder, 1) has collected 49 cases from the literature, of which only two were well for any length of time following operation. But the ultimate hopelessness of resection of the superior maxilla is not the complete story, because from the European clinics comes the tale of an operative mortality of 15 to 30 per cent. Koenig's (quoted by Scudder, 1) experience at the Gottingen clinic was even worse, for in 48 total upper jaw resections there were 19 operative deaths (39 per cent).

With the introduction of radium it was hoped that at last we had at our disposal an agent on which reliance could be placed, if used in conjunction with conservative surgery. But it appears that the factors which caused surgery to fail hinder in the same manner the newer forms of treatment. These conditions are:

1. Carcinoma of the antrum is locally a highly malignant disease. It grows rapidly, infiltrates widely, and invades bone readily, but the lymph glands are rarely involved.

2. Accurate and early diagnosis is rendered difficult by the fact that cancer in itself does not produce specific clinical signs and symptoms, and it is only when a tumor is produced that mechanical disturbances appear. But this appearance is slow and insidious when the growth is in a hidden cavity like the antrum, and the diagnosis of the disease is often too late for successful treatment.

3. As is the case with all cancers of the mouth and nasal passages, inflammatory processes may predominate, and an incomplete diagnosis of empyema of the antrum, or simple polyp, may delay proper recognition of the essential disease, until the neoplasm is hopelessly advanced.

Numerous contributions on experience with radium therapy have been made to the current medical literature during the last few years. While many of these are nothing more than single case records, a general review of them indicates that distinct advances are being made. New (3) reports from the Mayo Clinic that in carefully selected cases he opens the floor of the antrum with a hot soldering iron, thereby destroying the growth by heat. Radium is used later as indicated. He claims that the results are much better than with jaw resection and mentions three cases clinically free of disease for 13 months, 15 months, and 17 months.

Our experience in the use of heat in antral cases has not been satisfactory enough to warrant its adoption as the method of choice. It is true that a bulky portion of the neoplasm is destroyed quickly. On the other hand microscopical evidence indicates that in surrounding tissues there is produced a paralysis of blood vessel walls and a dilatation of lymphatic spaces. Moreover, there is an inhibition of lymphocytic infiltration, the presence of which is now thought to be of the greatest service in local cancer restraint. The cautery, therefore, produces an effect which is diametrically opposed to that of radium. Unless we are fortunate enough to kill every cell of the cancer during the heating process, we fear that the effect of the cautery on the outlying tissue would tend to spread the disease.

Ochsner (4), Blaisdell (5), Greene (6), and Patterson (7) have also contributed recent articles on the management of such cases by radium.

Carcinoma of the antrum is not an uncommon disease. Ewing states that at the Memorial Hospital during the years 1916–17, out of 1892 cases of cancer of all types admitted, 35 (1.84 per cent) involved the maxillary sinus. He recognizes the following types:

1. Papillary carcinomata, some of which are malignant transformations of papillomata.

2. Carcinomata of basal-cell type. They are often designated as adenoid cystic epitheliomata, endotheliomata, or cylindromata.

[1] From the General Radium Service of the Memorial Hospital.

3. Squamous-cell carcinoma which arises by metaplasia from previously altered lining epithelium.

4. Cylindrical-cell carcinoma which forms a bulky tumor and is unusually malignant. It is adenocarcinomatous in type.

5. Round-cell carcinoma of atypical structure which is often designated as sarcoma.

6. Dental tumors which not infrequently develop in the antrum. They include the squamous and glandular types of adamantinoma.

The exact point of origin of carcinoma of the antrum is usually never determined. Many undoubtedly arise from the mucous membrane of the sinus itself. Epithelial rests in connection with a tooth-socket may account for some. Phillips (9) has recorded in detail 16 cases which were described as burrowing epitheliomata. They grew from a tooth-socket and developed upward in the direction of least resistance, filled the antrum, and then burst through the alveolus after the extraction of the teeth for the relief of pain. Others spring from the mucous membrane of the ethmoid region and after occluding the nasal passage spread along the orbital plate. Certain it is that no matter where the seat of origin, the soft friable inflamed growth readily fills the cavity, and as development continues erodes the bony walls which are confining it. Thus the orbital contents and the capsule of Tenon may become involved, producing a prominent and faulty moving eye. Or pressure may be exerted on the thin facial wall, in which event perforation occurs near the infra-orbital foramen, producing a swelling of the cheek and later ulceration. The more extensive cancers advance through the posterior wall into the pterygoid fossa rendering the prognosis hopeless. In many cases the alveolus and palatine process are the last to be destroyed, and a mushroom-like tumor sprouts through into the mouth, being thereby the means of finally forcing the sufferer to seek treatment.

As has been indicated, antral cancers may produce signs and symptoms referable to the nose, orbit, or teeth long before the presence of an associated tumor is suspected. Therefore rhinologists, ophthalmologists, and dentists have the first opportunity of making a diagnosis and instituting appropriate treatment. Too often our records reveal one or more intranasal operations on recurring polyps which of course are secondary to the malignant disease; or a dental surgeon extracts molar teeth because of pain, with the result that the sockets do not properly heal, but become filled with a new tissue which for a time is believed to be "proud flesh." Again an antral empyema is suspected, and a very conservative opening is made in the anterior wall for irrigation purposes.

The first symptom in many cases of this series was persistent pain or burning over the cheek, due to irritation of the fifth nerve. Later this pain was referred to the teeth or forehead. There was usually temporary relief when the tumor perforated. Nasal obstruction was a common first symptom, and was accompanied by a purulent and later a blood-stained discharge. The average duration of such symptoms before the patients were first seen at this clinic was 7 months. Tenderness over either the antrum on percussion, or the palate on pressure, was frequently present. Radiographic examination was of great value in revealing a definite antral opacity, and if the tumor was large, there was a distortion of the turbinates and septum. If any doubt exists after such findings, an exploration from below is certainly advisable. This is strongly advocated by Moore (10).

In general, the plan of treatment that has been developed at the Memorial Hospital includes the pre-operative, the operative, and the postoperative use of radium.

Pre-operative treatment. The antrum and accessory sinuses are subjected to a maximum "pack" treatment from a distance of 6 centimeters. The "pack" is a flat brass box with walls 2 millimeters thick, and an area of 77 square centimeters. It contains silyer capsules of glass emanation tubes. The dosage given is about 9,000 millicurie hours, which will produce a slight skin erythema. The lymphatic glands of the neck are exposed in the same way. With such heavy filtration only the deeply penetrating rays are effective. When the available emanation was limited, we have recently substituted X-radiation in the pre-operative phase of treatment. Although theoretically not as efficient, it nevertheless has a distinct field of usefulness, especially in clinics that are equipped with only a small amount of radium.

Operative treatment. Before the tumor area is touched, a 10 centimeter skin incision is made under local anæsthesia along the anterior border of the sternocleidomastoid muscle. The lymph-bearing tissue close to the internal jugular vein and in the posterior submaxillary space is exposed and examined. If there is any suggestion of metastases, a complete neck dissection is at once performed. If not, unfiltered emanation tubes are inserted, and the external carotid, lingual, and facial arteries are ligated. By tying the latter two vessels, the establishment of a vigorous anastomotic circulation is much delayed.

Although such a careful observer as Butlin (11) did not approve of a preliminary ligation, we believe from experience that it is a wise procedure for two reasons. First, the danger of serious hæmorrhage from the primary growth is much reduced both during the second stage of the operation and at a later date when the radium slough separates from the antrum; and second, the starving effect on the tumor is a distinct aid to any method of radiation treatment. We have performed the operation of ligation in well over 400 cases of oral and associated cancers with no bad results. Matas (quoted by Scudder, 1) refers to two fatalities from cerebral embolism, but there seems to be no danger if the point of ligation is well above the origin of the superior thyroid, and the lingual and facial arteries are tied separately.

The antral operation is performed at the same sitting or postponed a few days, depending on the patient's condition. It is essentially an operation to expose the growth for radiation. The method of approach varies with the local condition.

1. Many cases present signs of increased intra-orbital pressure and a swollen cheek with the swelling most prominent adjacent to the inferior rim of the orbit. The palate and alveolus indicate no evidence of invasion. The cancer has, therefore, followed the orbital plate, and not the antral floor. The logical operation is to make an opening closest to the bulk of the growth, namely through the floor of the orbit. At first we hesitated to sacrifice a functioning eye, but we now believe that in many instances our hesitancy was the cause of ultimate failure. In a few patients with the eye remaining *in situ*, the severity of the radium inflammation in adjacent tumor tissue forced us to remove it subsequently. These patients would have been spared much suffering if we had been less conservative at the outset.

2. In another group there are no orbital signs and symptoms, and the external tumor is well below the eye. The alveolus and palate are however swollen and perhaps destroyed. The cancer has therefore grown downward, and is best reached through a large window made below.

3. A third and smaller group may require an opening through both the orbit and the alveolus. These are very advanced cases, but we feel that in selected patients, there is the possibility of clinical cure or palliation.

Radium is applied by tying unfiltered emanation tubes in the end of an ordinary rubber finger cot, and packing it centrally or toward any wall depending on the needs of the case. As a rule about 35 to 40 millicuries are used for periods varying from 48 to 60 hours. This dosage, of course, produces an intense caustic effect, but we believe that nothing less will suffice. In 6 to 10 weeks slough and destroyed bone are gradually cast off. As may be inferred, we place our main reliance on the destructive qualities of radium, and not on cauterization or curettage.

Postoperative treatment. During the weeks following the operation, constant attention is given to the radiated area. Frequent irrigations are absolutely necessary on the part of the patient, because when the radium slough commences to form a very disagreeable odor is given off. Loose stringy necrotic tissue and fragments of destroyed bone should be gently removed. If a large sequestrum forms, many weeks may elapse before it loosens and separates. While in place, it is a constant source of annoyance, because of pain and suppurative discharge. Excessive granulation tissue may form about it, giving the false picture of a recurrence. After the effect of the operative treatment subsides, careful observation is made for possible neoplastic nodules that have not completely regressed. If any such areas are present, and they appear to be enlarging, emanation tubes or filtered needles are applied. But caution should be used in order not to treat unnecessarily, because it is our experience that regression may continue, even though outward radium effects have disappeared.

This series of cases from the Memorial Hospital records comprises 24 carcinomata of the antrum. Of these 12 were in females and 12 in males.

The age incidence is as follows:

Decade	Cases
Fourth	3
Fifth	10
Sixth	5
Seventh	4
Eighth	2

Before being referred to the hospital 11 cases were surgically treated for wrongly diagnosed empyema. Five sought the attention of a dentist who extracted teeth for the relief of pain. Two cases were operated on intranasally one or more times for obstruction. One patient had a complete resection of the upper jaw with a large recurrence.

Cervical nodes were present only three times. In one case on account of patient's poor general condition, emanation tubes were inserted and no attempt made to do a complete neck dissection. In all except four instances, roentgenographic examination revealed the destruction of one or more of the walls of the antrum. It may, therefore, be concluded that the cases taken as a group were far advanced.

The results of treatment are briefly as follows:

Four cases were unimproved. These were hopelessly advanced. All were in poor general condition, and died before the results of radiation could be determined.

Four cases are showing a satisfactory response to the operative treatment.

Eight cases were improved locally and generally, although they were never at any time free of malignant growth. The duration of palliation extended in one instance to 4 years.

Four cases present no clinical evidence of disease for varying periods, as follows: 2 cases for 1 year; 1 case for 1½ years; 1 case for 5 years.

In addition 3 cases were free of disease for 1 year, 3 years, and 4 years, but later failed to return to the clinic, so it must be assumed that they finally succumbed to cancer.

The last case of the group was free of disease for 6½ years, but after neglecting to come for observation for several months, returned with a large recurrence projecting from the roof of the antrum. This is being treated at the present time.

Two case records are given in detail.

CASE 1. (26387.) W. B., female, age 59, came for treatment in November, 1918, giving a history of neglected teeth. Following the extraction of some troublesome molar roots, a swelling of the gum appeared, which was followed in a few months by the protrusion of the eye on the same side. At first pain was severe, and was situated in the cheek and forehead. Two months before coming to the hospital an ulcer developed in the roof of the mouth, close to the site of the previous dental extraction. The pain was then temporarily relieved.

Examination revealed that the patient was weak and anæmic. The left cheek was swollen and red. The left eye was more prominent than the right. The nasal passage was completely occluded, and occupying the entire half of the hard palate was an irregular ulcer 3 by 4 centimeters in area. A note on the record says: "This is a very advanced case in a woman of poor general condition. Treatment should be directed toward a palliation and not a cure." Microscopic diagnosis was epidermoid carcinoma. She was treated by embedding unfiltered emanation tubes directly in the growth through the palate. Radium was used in November, 1918, February, 1919, and April, 1919. Following this the local condition was satisfactory until March of 1922, when a further radium application was made because of evidence of active tumor growth. The patient died in July, 1922, from chronic sepsis and circulatory failure. No autopsy was obtained. This case is of interest as showing that a long palliation may be obtained by the use of radium without operative interference.

CASE 2. (23737.) M. S., male, age 47, came to the hospital in September, 1916. His illness commenced 3 months earlier with the appearance of a small lump on the alveolar process of the right upper jaw. The right side of the face soon became swollen. A dentist was consulted who removed a tooth. The socket never healed. Examination on admission to hospital showed that the patient was in good general condition. An egg-shaped ulcerated mass 3 by 5 centimeters projected from the alveolus and palate. Externally there was a discoid swelling of the cheek, the skin of which was red. Nasal examination revealed that the ethmoid area was not involved. There were no palpable nodes in the neck. The late Dr. Janeway ligated the neck vessels, removed what was left of the floor of the antrum, and applied unfiltered radium emanation. After a few weeks, large portions of slough and dead bone came away leaving a healthy cavity. There were no further manifestations of the disease until January, 1923, when a recurrence was noted close to the floor of the orbit. This was treated by packing a finger cot of emanation tubes close to the tumor tissue. In a few weeks the cancer area sloughed away exposing the floor of the orbit. A small discharging fistula formed below the lower eyelid, communicating with the anterior antral wall, a portion of which was destroyed. This caused a considerable degree of orbital inflammation, and for awhile we believed that the eye was in danger. However, in June the sequestrum loosened, and was removed through a small window made in the cheek surrounding the fistula. It proved to be the orbital plate with a large portion of the anterior wall. At the present time there is no evidence of new-growth. This illustrates that it is hardly wise to consider a case cured even after nearly 7 years. The patient is to be congratulated so long as no recurrence appears.

SUMMARY

1. Cancer of the antrum must be recognized in the early stage before any method of treatment will produce uniform and favorable results. The opportunity is given to rhinologists and dentists, but facts indicate the tardiness with which they make an accurate diagnosis.

2. Conservative surgery combined with radium promises to give better results than does the radical operation.

3. Palliation for a large number of hopelessly advanced cases is possible through the conservative use of radium.

4. The successful application of radium depends on an adequate exposure of the area. As a rule an oral approach is best, but if conditions demand it the eye should be removed and the floor of the orbit opened.

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A NEW SPLINT FOR FRACTURE OF THE HUMERUS

By CARL R. STEINKE, M.D., F.A.C.S., Akron, Ohio

GENERALLY fractures of the humerus in the newborn are not hard to hold in position once good alignment is obtained. The muscle pull is slight and the bones are rather easily controlled.

The splint to be described is applicable for fractures of the humerus and clavicle in the newborn. The splint is permeable to the X-ray, and seems to meet most of the requirements for the proper reduction and retention of the fragments.

The curved wire is covered with muslin or cheesecloth to support the head. The inside measurement is 6¼ inches across.

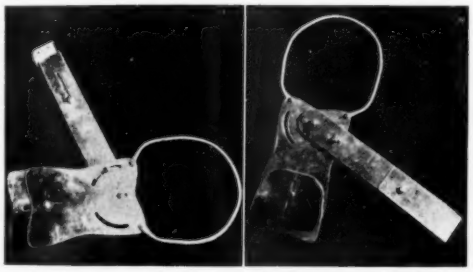

Fig. 1. Photograph showing a front view of the splint for fracture of the humerus in the newborn.
Fig. 2. Back view of the splint.

The lateral arm piece is adjustable as to length and angulation of the arm with the body. It may be adjusted for the right or left arm. The two perforations in the upright piece at the outer end of the extension are for the attachment of a windlass; or a rubber banjo type of extension may be employed. The arm extension is 11 inches in length when it is closed up and 13 inches long when it is extended, and is 1¾ inches wide.

The body piece is also adjustable as to length, being 6½ inches long through its center when closed up and 8½ inches when the extension piece is drawn out. The width of the body piece is 3¾ inches at the narrowest point and 4½ inches at the widest.

The infant is bandaged to the body piece and the extension is applied to the arm. Coaptation splints are used at the point of fracture in the humerus. The fragments can be adjusted under the fluoroscope and when they are in good position the body and arm of the infant, along with the splint, are encased in plaster of Paris.

This allows for easy handling and caring for the baby who can be placed at the mother's breast

Fig. 3. How the infant appears on the splint. *1*, Bandage; *2*, head rest; *3*, coaptation splints; *4*, adjusting arm extension; *5*, adhesive extension; *6*, windlass.

without inconvenience. The infant's toilet is easily and safely cared for as there is little danger of displacing the fragments after the plaster is employed. The method is applicable in bad fractures of the clavicle.

I am greatly indebted to Dr. Jos. L. McEvitt for valuable suggestions during the development of the splint.

MODIFICATION OF ESTLANDER'S OPERATION FOR LIP DEFECT

By ELMER D. TWYMAN, M.D., F.A.C.S., Kansas City, Missouri

Attending Surgical Staff, St. Luke's Hospital; Surgeon, Christian Church Hospital; Surgical Courtesy Staff, St. Joseph Hospital; Surgical Courtesy Staff, Research Hospital

PROPER surgical removal (1) of an epithelioma of the lower lip may result in a defect requiring a plastic operation for the restoration of the defect. Lesions in or near the midline leave particularly large gaps in the mid-space. All surgeons are familiar with the incisions credited to Grant (2), which run downward and outward in the line of, or parallel to, the facial artery. These incisions make it possible to sew the lower lip in the midline and afford a valuable and quite logical device, because the incision follows the natural line of spread of the growth, uses the seldom involved chin as a prop to maintain proper form, and lastly can be extended into the neck when it is desired to dissect the submaxillary and submental glands, and to mobilize widely the flaps to be moved. This repair is often all that is needed. However, at times the result is a tight lower lip and a pouched upper, the mouth tending to be too small. The same defect may appear in repairs of a lower lip from which an epithelioma has been removed by the classical but obsolete V-shaped incision.

Two operations have been described, each of which overcame one of these consequential defects. Burow[1] did away with the pouching upper lip by outlining and sacrificing a triangular piece at both corners of the upper lip. This did not take the tension off the lower lip nor enlarge the small mouth. A useful piece of tissue is unnecessarily sacrificed. Estlander's operation (3) takes a triangle from the upper lip and puts it in the lower one. No unnecessary tissue is sacrificed and the tension on the lower lip is released; while the pouched upper lip is reduced to normal proportions. However, the mouth as a whole is smaller than ever. I have attempted to overcome this difficulty.

Figure 1 shows the condition following a Grant operation or the typical V-shaped removal and repair. The mouth is smaller, the lower lip tight, the upper lip pouching.

Figures 2 and 3 show the outlining and disposal of a triangular flap, a modification of Estlander's operation which I regard as an improvement because it remedies all the defects mentioned including the smallness of the mouth. I did this under local anæthesia. A triangle is outlined and cut from the upper lip at each corner of the mouth, its apex upward in the nasobuccal fold, its base downward and its lateral side prolonged downward and outward lower than the angle of the mouth. The nourishing pedicle left is attached to the lower lip, inner side. Additional room is had by a further incision extending outward in the line of the mouth. As the tension of the lower lip is released, the lower incision gaps open, a space is opened up into which the triangle of tissue from the upper lip naturally fits. Suture of the sides of the defect in the upper lip makes a natural looking line, the nasolabial fold. The

[1] Binnie. Operative Surgery, p. 125.

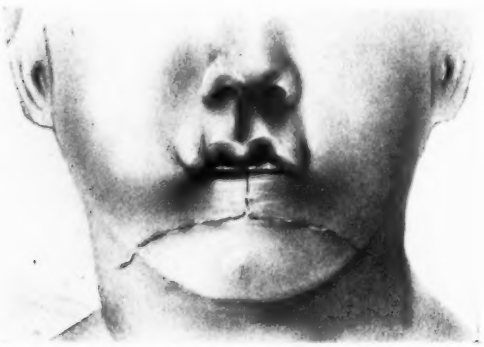

Fig. 1. Results after Grant's operation.

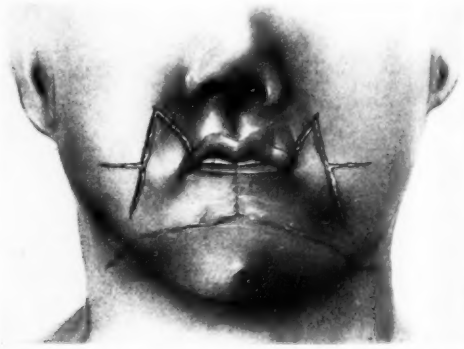

Fig. 2. Lines of incision for modified Estlander operation.

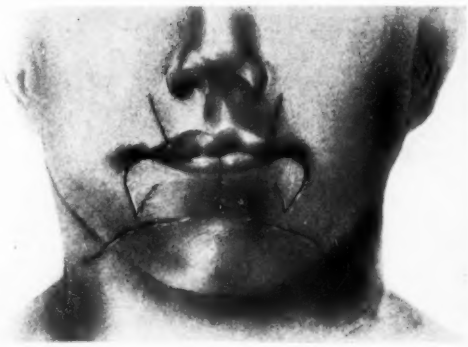

Fig. 3. Result after the author's modification of Estlander's operation.

Fig. 4. Photograph showing final results of author's modification of Estlander's operation.

mucosa is suitably sutured at the corners. Leaving the sustaining pedicle attached to the lower lip instead of the upper allows indefinite lateral extension of the os without endangering the nutrition of the triangle to be moved. Accurate measurement demonstrated in advance the gain that would be made. Figure 4 (a photograph) shows the final results which were satisfactory both for looks and function.

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MODEL OF UNIVERSAL CASE FOR SURGICAL DRESSINGS

By Dr. GUILERMO BOSCH ARANA, Buenos Aires, Argentina

IN the daily round of making dressings in hospital wards the surgeon requires a dressing case containing dissecting forceps, scissors, lancets, sounds, and curettes. For this purpose every surgical ward should have as many sets of forceps as there are beds, for I consider that 50 per cent of the patients in the ward need surgical dressings. Such an equipment would relieve the surgeon of the necessity of "burning" the instruments, a reprehensible and costly practice in the long run, because of the rapid destruction of the nickel-plating, necessitating the constant and frequent renewal of the instruments used for dressings.

A short supply of forceps is poor economy, for it is evident that a forceps burned is a forceps ruined in a very short time; whereas, if we have at our disposal as many forceps as there are patients, that is, one for each bed, we may sterilize them by boiling and so make them last much longer. On the other hand, a dissecting forceps may be valued at a dollar and so the outfit for a ward of 50 beds would not exceed fifty dollars.

In the cases for ordinary surgical dressings we find the instruments—scissors, forceps, sounds, or curettes—all huddled together without due attention to asepsis. To get out a pair of forceps or scissors, we have to remove those on the top which cover up the one we need and we tip the whole contents of the case, shake the instruments roughly, or even stir the mass with one of the instruments.

Any one of these maneuvers is objectionable in the light of art or septic surgery. If by good fortune the instrument sought is on the top of the others, in grasping it with the fingers, it would not be unusual, and it *is* usual, to touch another instrument near and thereby soil it and it soils those near it as a natural consequence; so that after a fourth or fifth dressing, all the instruments would fall under the ban and suspicion of being septic.

If the instrument sought for is entangled or covered with the others, it is impossible to get it out with the fingers, and if we have recourse to a dissecting forceps, we must move the instruments about, get hold of one and not lose patience if it graps another or becomes entangled with another which loosens itself most casually and frequently drops to the floor while we are trying to disentangle it.

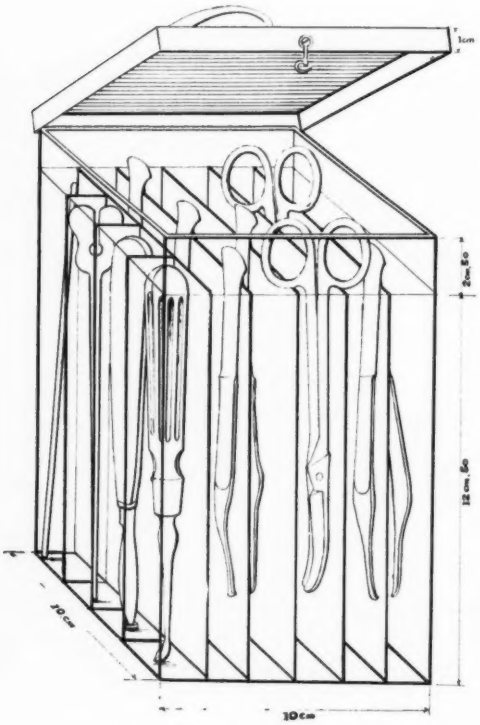


Fig. 1. Diagrammatic drawing of the box.

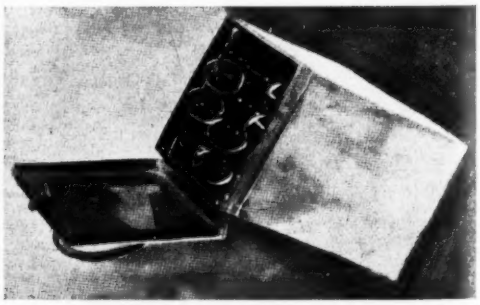


Fig. 2. Photograph of the box.

The dissecting forceps does not seize another instrument firmly, for it is not made for that. *Instruments should be used exclusively for the purposes for which they are intended.*

Well do surgeons know the inconvenience described and its dangers, but in the majority of our hospital wards nothing has been done to minimize the difficulties, either because no one has paid due attention to the facts mentioned or because dressings are left to assistants, or again because a proper case is not available for such purposes exclusively.

When I took charge of the Surgical Ward of the Pinero Hospital, I tried to find a case in which to carry ordinary dressings and which would prevent the drawbacks mentioned. I decided that an ideal dressing-box should carry out two basic requirements: (1) asepsis in picking up instrument, and (2) freedom in choosing it.

The first requirement means that when any instrument is being taken out those near it should not be touched. For this reason I have adopted the vertical position for the instruments placing them astride a partition as may be seen in Figure 1. The forceps and scissors are astride; the lancets, sounds, and curettes are in separate divisions. All are placed with the prehensile end exposed; scissors, their loops; forceps, their handles; lancets and curettes, likewise; and the sounds, their pinna or fin.

The second requirement is also met, for the surgeon can select at will the instrument most suitable to his needs, and on grasping it, he does not touch any other, for it is quite separate in its compartment. The instruments remain in order for each one has its proper place.

These basic requirements being filled, we studied others no less important so that the box might be utilized in any surgical emergency without further outlay. We selected a box of universal pattern (Fig. 2) which is not only useful but can be easily sterilized. It fits into any sterilizing oven, and, at the same time, carries any instrument of usual size so that the surgeon can put into it his outfit for private use. It is not necessary to purchase special instruments to fit the box. Thus it is practical, useful, and universal. The cost is equal to that of an ordinary barrel for dressings.

The dimensions are 10 by 13 by 18 centimeters, allowing space for the material for twenty dressings; that is to say, it serves a ward with 40 patients and holds 40 forceps, 2 lancets, 4 pair of scissors, 2 curettes, sounds, and stilettos at will, all in perfect order and all separated.

When the case is open, the handles are exposed to view, the points being turned inside which keeps them free from contact until the moment the wound is to be dressed.

The instruments that have been used are left on a tray to be cleaned. The case is cleaned by removing the partitions which come apart for the purpose.

The model which I present has shown excellent results; backed by my own experience and the opinion of all those doctors who have used it in my surgical ward for two years, I can recommend it to my distinguished colleagues as a universal case for dressings which saves time, simplifies external medicinal applications, keeps the instruments in perfect shape, rigidly aseptic, absolutely clean, and in attractive form.

A NEW METHOD FOR RHINOPLASTY

By Dr. OSCAR IVANISSEVICH, Buenos Aires, Argentina

From the Institute of Clinical Surgery

BECAUSE of the difficulties with which the surgeon has to battle to obtain an acceptable result in a nasal plastic operation, I have proposed a new method of grafting at a distance. The method consists fundamentally of the following stages:

1. An oblique incision is made on the upper third of the helix of the external ear (Fig. 1). The lower border of the incision is immediately sutured with interrupted stitches.

A fresh surface is created on the fleshy part of the thumb so that it will attach itself to the upper border of the ear. This attachment must be very neat and be made in such a manner that the ear will remain doubled in its upper portion with the exterior plane facing inward and the interior plane facing outward, as in Figures 2 and 4. A last stitch with catgut fixes the cartilage to the bottom of the finger wound and a double skin stitch insures coaptation of bloody surfaces.

Once the surfaces in contact have healed and perfect union between the ear and the thumb is assured, a hæmostatic forceps is placed in such a manner as to interrupt the auricular circulation. Gradually a new circulation is established through the thumb circulation and the ear flap is thus nourished.

2. When the circulation has been established sufficiently to maintain the life of the graft—and this can be determined by leaving the hæmostatic forceps in place for 3 or 4 hours to see whether the ear remains free from cyanosis or œdema—one may proceed to remove the transplant from the ear (Fig. 5). Generally the circulation becomes established in from 16 to 18 days. When the transplant is removed, the lower border of the auricular wound is freshened and the edges of the upper and lower wounds united with separate non-perforating sutures which are tied on the inner face of the ear (Fig. 6).

The border of the transplant farthest from the ear is freshened and attached to the nose at the site of the defect, with the hand placed in such a

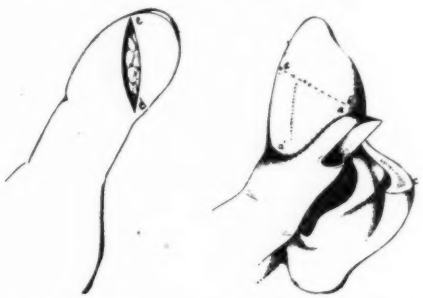


Fig. 3 (left). Rhombic incision of finger ball of left thumb.

Fig. 4. Suture of finger to ear. *b-b'*, Point of application of the hæmostatic forceps.

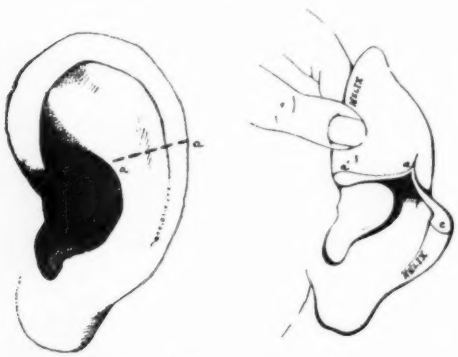


Fig. 1 (left). Auricular incision, *a-a'*.

Fig. 2. The ear is doubled in its upper portion.

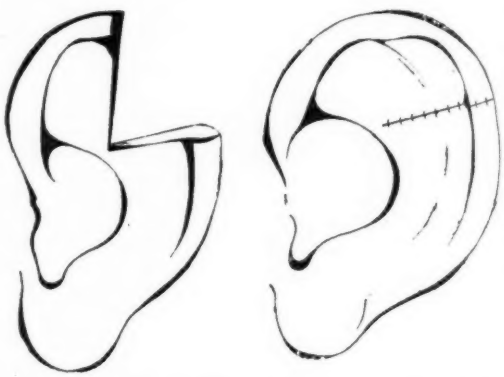


Fig. 5 (left). Auricular loss of tissue which is same size as transplant needed.

Fig. 6. Restoration of loss of substance.

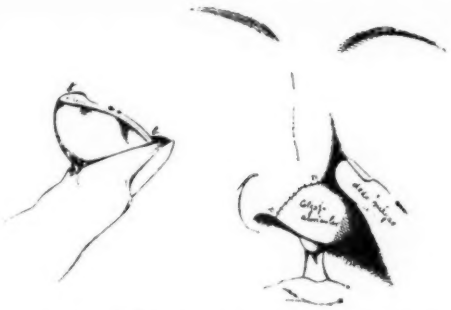


Fig. 7 (left). The auricular flap grafted in thumb and prepared for transplantation.
Fig. 8 The auricular transplant sutured to the nose.

position that the graft may be stitched in two layers: the deeper layer with fine catgut and the superficial layer with skin sutures. This makes a very firm closure (Fig. 8). After 7 days, intimate union is established between the auricular transplant and the nasal border. A hæmostatic forceps is applied at the top of the pedicled graft, and we test the circulation as we did in the first stage.

3. When repeated attempts to constrict the circulation with the forceps show that the circulation is established (14 to 16 days are generally sufficient), the wound on the thumb is sutured by interrupted stitches. When the thumb is freed from the nose, the transplant generally becomes cyanotic and slightly œdematous. Therefore, it is left free at its posterior portion (Fig. 9), until the circulation is established.

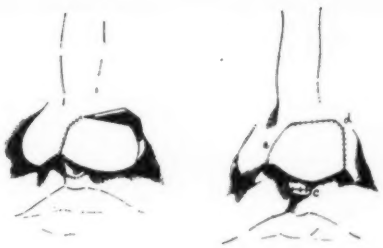


Fig. 9 (left). Free portion and fixed portion of transplant.
Fig. 10. Definite seams of transplant.

4. When the œdema and cyanosis have disappeared, the corresponding nasal border and the free border of the auricular flap are freshened and are stitched, in the same technique as used in attaching the transplant to the nose (Fig. 10). Generally, it is not necessary to use finishing touches, but when it is necessary, they are reduced to surgical acts of secondary importance.

As the graft itself is made up of a cartilage support and two skin surfaces, it has many advantages and its use makes the plastic operation for repair of the nasal soft parts an ideal one. On practical grounds the method has given wonderful results leaving the nose, ear, and thumb normal in every respect.

REFERENCE

Prensa med. Argentina, Buenos Aires, July 30, 1921.

PARAVERTEBRAL ANÆSTHESIA IN KIDNEY SURGERY

By GUSTAV KOLISCHER, M.D., ALFRED E. JONES, M.D., OSCAR G. SCHNETZER, M.D., Chicago

THE development of modern renal and ureteral surgery with the widening scope of its indications has of necessity led to the employment of paravertebral anæsthesia in this special work. Accumulating evidence has proved the fact that while the refinement of technique employed has reduced the surgical risk, the safety of renal operations is still impaired by unavoidable dangers if inhalation anæsthesia is used. These dangers are particularly great if one kidney has to be removed and the burden of elimination falls upon the remaining one, or if the patient at the time of operation suffers from disorders of other organs, the deficiencies of which are likely to be aggravated by general anæsthesia.

Since Sellheim used paravertebral injection anæsthesia successfully in abdominal operations, the same method has been repeatedly employed in kidney operations, and the problem remaining has been to develop a technique especially adapted to this purpose and answering the demands of safety and uncurbed reliability in the production of operative anæsthesia.

The abundance of material in the urological clinic in Budapest enabled Schnetzer to solve this problem on the living after extensive work on the cadaver had established all anatomical and topographical details. The blocking of the pertinent nerves was tested on about 600 cases at the Budapest clinic and except for a few instances to be reported, proved entirely satisfactory. Since that time this method has been employed by several surgeons in America and by ourselves and we have obtained results similar to Schnetzer's. There were four failures. In these cases, after the operation was started the patients insisted upon general anæsthesia for psychological reasons and not on account of physical pain. They declared that they could not bear the rattling of the instruments and the idea of being operated upon while conscious.

In infants the employment of paravertebral anæsthesia meets with insurmountable obstacles on account of the difficulty of managing the youngsters. In transperitoneal kidney surgery a satisfactory anæsthesia cannot be obtained by this method.

TECHNIQUE

Just as in sacral anæsthesia the most successful mixture proved to be a 1 per cent procaine solution with the addition of sodium bicarbonate, potassium sulphate, and hydrochloric acid as follows:

Formula

Procaine	1.5 gms.
Sodium bicarbonate	0.7 gms.
Potassium sulphate	0.6 gms.
Dilute hydrochloric acid minim	3.0 gms.
Distilled water q. s. ad	150 ccm.

This solution is always freshly prepared before use and is sterilized by boiling for a few minutes. It is injected after having cooled off to room temperature. Suprarenin is preferable to adrenalin on account of being a synthetic product, which is more easily standardized than is the organic derivate. The only after-effect of suprarenin may be a slight rise in the pulse rate and blood pressure, both phenomena subsiding after a few hours. It is never necessary to use more than 150 cubic centimeters of this solution, and in lean individuals even 100 cubic centimeters may suffice.

For the actual injection it is of advantage to have the patient in the sitting posture with the legs dangling down over the edge of the table and with the back slightly arched. However, if deemed preferable the patient may lie on his side, opposite to the one which is the locus of the operation. In this case the head is slightly inclined toward the chest and knee and hip joints are flexed.

The skin over the whole half of the thorax is sterilized in the routine manner, this disinfection including the adjacent part of the abdomen.

In choosing the points of inserting the needle it must be kept in mind that it is necessary to block the eighth, ninth, tenth, eleventh, and twelfth thoracic nerves near their emanation from the intervertebral foramina distal to the junction of the anterior and posterior branches.

From cadaver work and clinical observation we have developed the following technique:

The scapula, the lower edge of the ribs, and the dorsal spinous processes are used for landmarks.

The first point of injection lies in an imaginary line drawn from the scapular angle to the eighth processus spinosus, at a distance of about 5 centimeters from the vertebral body. At this point an intradermal wheal is raised by using a fine needle for injecting the solution. In this same way four more marking wheals are raised following a vertical line drawn downward over the lower intercostal spaces. This secures superficial anæsthesia facilitating the following deep injections. For this

purpose a long No. 18 gauged needle is attached to the syringe and the needle point is plunged in until it touches the lower edge of the rib. At this point 4 cubic centimeters of the solution is injected into the interstice. Then the needle is slanted and the tip pushed toward the median line until it touches the vertebra. Here a slight movement toward the front alongside the vertebra for about 0.5 centimeter will bring the tip opposite to the intervertebral foramen, where again 4 cubic centimeters are injected.

The same procedure is repeated in all the intercostal interstices. Before the paravertebral injection is attempted the syringe is detached from the needle each time, in order to determine whether or not the tip has entered a blood vessel. If a blood vessel has been penetrated blood drips out of the distal end of the needle. A direct injection into a blood vessel might give rise to toxic symptoms. If such an accident should occur, the needle must be withdrawn and reinserted under the same control. The tip of the needle may accidentally puncture the pleura. The patient coughs as soon as the needle point enters the pleura but if the needle is slightly withdrawn that closes the incident. In very muscular or in fat individuals it will be of advantage to increase the amount of the solution injected at the lowest point.

It is also a good plan after the paravertebral infiltration is finished to test the sensibility of the skin covering the field of operation. This is best done by picking up successively folds of the skin along the line of the intended incision and pinching the folds. In case no complete anæsthesia of the integument is encountered, this condition is brought about by intradermal infiltration with the same solution. It takes altogether about 20 minutes for the paravertebral nerve block to take full effect, and this time should elapse before the operation is started. The anæsthetizing effect of this procedure lasts for about 2 hours, which time should be amply sufficient for the completion of any renal surgery.

The complete success of this method depends partially on the mental and physical preparation of the patient and upon the conduct of personnel in the operating room. The patient should be informed about the advantage of regional anæsthesia, and it must be impressed on him that any fear of pain during the operation is unwarranted.

During the preparation of the patient and while he is placed in the proper position, quiet should be observed except for soothing remarks addressed to the patient, if necessary. The same holds good in the operating room, which should be darkened, the operator and his assistants working under a spotlight. All clattering with instruments and splashing with solutions should be avoided. It is of great advantage to keep the patient's eyes covered with a moist compress and to have a special attendant sit at his head. This and an occasional inquiry by the operator will help keep the patient in a complacent mental attitude.

The use of narcotic drugs previous to paravertebral infiltration deserves some discussion. Generally speaking the administration of such medication should be avoided if possible; occasionally morphine depresses the kidney action and may nauseate the patient, and if, as in rare instances will be the case, it should be advisable to administer an opiate after operation, a cumulative effect may be produced.

On the other hand, if one has to deal with a very nervous and excitable individual, a previous administration of a sedative may be necessary to bring about the complacency of mind in the patient which is essential for the success of the paravertebral anæsthesia. In case pre-operative administration of a sedative is decided upon, the best way to give it is to place in the rectum about 15 minutes before the injections are started a suppository containing one fourth of a grain of morphine. This mode of medication promotes a slow absorption of the drug and prolonged action.

The employment of scopolamine, however, seems not to be advisable in kidney surgery. The efficiency of the kidney as an eliminating organ depends upon the quantity of blood forced through it in a given time. The retarding influence of scopolamine upon the circulation necessarily impairs the functional activity of the renal tissue, which fact may be of serious disadvantage, especially if one kidney has to be removed and the remaining kidney has to take care of all the blood purifying work.

There are also advantages of the paravertebral anæsthesia to be observed in the immediate postoperative stage. As a rule there is no pain in the operative region, the "Wund-schmerz" of the German authors is missing, because in the majority of cases the topographically involved nerves remain anæsthetized for several hours, and the occasional sensations of slight pain are easily controlled by sedatives.

Patients who are just recovering from a general anæsthesia quite frequently become almost unmanageable during the state of semiconsciousness. They vomit, throw themselves around, and once in a while it becomes necessary to restrain them forcibly. These exertions may not only lead to exhaustion but may also produce postoperative

hæmorrhage. In the postoperative stage after paravertebral anæsthesia, these unwelcome incidents do not occur; on the contrary, the patients quite often are more quiet after the operation than before. They not only do not suffer, but appreciate that at a slight discomfort they bought freedom from all the misery following the use of general anæsthesia.

To the paravertebral anæsthesia may also be ascribed a very beneficial influence on the morale of all the patients in a surgical ward. If a patient after what is known to be a major operation is returned to his ward conscious and free from all the disagreeable aftermaths of a general anæsthesia, if, as happens so frequently, he, immediately after having been placed in bed, expresses a desire for food, or for a smoke, this complex cannot help but favorably impress his fellow patients.

SUMMARY

Paravertebral nerve block conducted by a proper technique furnishes in practically every instance a satisfactory anæsthesia.

There is no mortality produced by a paravertebral anæsthesia. It is applicable in all renal and ureteral surgery executed through the retroperitoneal route.

The method described above has been almost universally satisfactorily employed by the authors and other American surgeons in about 700 cases, with four failures only, and these, without any prejudice, may be ascribed to the extreme neurotic condition of the patients.

Of the cases mentioned 16 were children between the age of 7 and 15 years.

Paravertebral anæsthesia is particularly indicated in renal surgery when the patient to be operated upon is suffering from pulmonary, circulatory, or bilateral renal disorders. It is contraindicated in infants and when it is necessary to perform the operation through the transperitoneal route.

The disagreeable and dangerous after-effects of general anæsthesia as shock, nausea, vomiting, aspiration pneumonia, anuria acidosis, etc., and those of spinal anæsthesia, as malaise, temporary paralysis or even *exitus letalis*, are done away with in paravertebral anæsthesia.

The technique is simple and easily acquired and mastered.

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

FRANKLIN H. MARTIN, M.D.....Managing Editor
ALLEN B. KANAVEL, M.D.....Associate Editor

WILLIAM J. MAYO, M.D.....Chief of Editorial Staff

JUNE, 1924

NEW ZEALAND AND AUSTRALIA

LAND of adventure and romance! What boy, of any age, reading the voyages of Captain Cook, has not promised himself the pleasure of a trip to New Zealand and Australia, those far flung provinces of Great Britain in the Antipodes? Six days out by boat from Vancouver, San Francisco, or Los Angeles, lie the Sandwich Islands. One should give himself a few days to visit this group, the volcano of Kilauea, and, in beautiful Honolulu, should see the Queen's Hospital. From Honolulu to Suva, Fiji Islands, is a sea journey of seven days. Suva is well worth a visit; it is fortunate in its Government Hospital, under Dr. Montague, chief of the Government Health Service, and Dr. Harper. Full-blooded Fijians here receive a two-year course in medicine and are taught to care for their own people. Three days on shipboard south from the Fijis brings one to Auckland, the northern port of North Island, New Zealand. In three weeks one may visit briefly the two great islands, which are the size of Great Britain, with one and one-third million fine people. To the west of New Zealand, three and one-half days by boat, is Australia, about the size of the United States without Alaska, with about six million people. From Australia or New Zealand the return trip to the United States may be made by way of Tahiti and the Cook Islands to San Francisco, or by way of the Panama Canal.

The medical profession of Australia and New Zealand is of a high grade and compares favorably with that of any country of the world. Medical men are highly esteemed by the people and politically are very influential. Quackery, while not unknown, is not in evidence. At Auckland we had the pleasure of attending a most instructive and interesting meeting of the New Zealand branch of the British Medical Association, Carrick Robertson, the president, presiding, with nearly four hundred in attendance. Many excellent scientific papers were read. A number of the medical profession of Australia, including the well known surgeons, Worrall and Craig of Sydney, and Russell and Ewing of Melbourne, were in attendance.

At Napier we inspected the excellent General Hospital, with Dr. Leahy, and a fine hospital conducted by Dr. Moore. Wellington, a city of about 100,000 people, the southern port of North Island, is the capital. With Dr. Herbert, Dr. Young, and Dr. Elliott, the talented editor of the *New Zealand Medical Journal*, we visited hospitals. We were greatly impressed with the work of Colonel Hunter, of the Department of Health, who gives to classes of thirty girls, planning to work in the outlying districts, a two-year course in the care of children's teeth which includes prophylaxis, extractions, reconstruction, and permanent filling.

From Wellington we crossed Cook's Straits and traveled down the east coast of South Island to Christchurch, an English settlement of about 80,000 on the Canterbury Plains. Here, also, very good work is done in medicine and surgery. Dr. Fox is chief of the splendid general hospital, where Dr. Foster, a most accomplished surgeon, gave several clinics. We were sorry not to see Dr. Acland, who was in England. From Christchurch we went by train to Dunedin, a Scotch town of 50,000 inhabitants, on the southeastern coast of South Island. In Dunedin is the splendid medical school of New Zealand, of which Sir Lindo Ferguson is the Dean, and Professor Barnett surgical chief, where we saw much interesting surgical work. Several fine pieces of research work were shown to us, notably that by Professor Hercus on the relation of the absence of iodine in the soil, especially on the Canterbury Plains, to the incidence of goiter. Another research was on the various tests for echinococcus disease, which is extremely common in this sheep-raising country. At the School of Anatomy we were shown by Professor Gowland some dissections of the tua tara, an animal found only in New Zealand, which throw interesting side lights on the development of the forebrain.

Sydney, our first stopping place in Australia, with its 1,000,000 inhabitants and splendid harbor, is the London of Australia. Here we attended many excellent surgical clinics. We were unfortunate in not seeing Sir Alexander McCormick, who was in England, but we were fortunate in seeing Dr. Clubbe, whose work on intussusceptions and pyloric obstruction in infants has done so much to encourage early operation. One is impressed after meeting Dr. Todd, secretary of the Australian branch of the British Medical Association, with the high caliber of men who take on themselves the direction of these societies. Prof. John Hunter, who holds the Chair of Anatomy of the University of Sydney Medical School, a young man only twenty-six years of age, has made a most important contribution to the study of the sympathetic nervous system in relation to muscular tone, which supplements the investigations of Gaskell and Langley. Professor Royle, of the Orthopedic Department, acting on this new knowledge, has divided the rami communicantes which connect the spinal cord with the sympathetic ganglion and has had some extraordinary results in the relief of spastic paraplegia, Little's disease, and certain Parkinsonian syndromes.

Melbourne, about six hundred miles south of Sydney, is a beautiful city of 800,000 inhabitants. We had the pleasure of attending many fine clinics and were greatly impressed with the surgical work. Devine has made notable contributions to surgery of the stomach. Professor Syme, senior lecturer in clinical surgery of Melbourne University, and Dr. Hooper, president of the Melbourne Medical Society, contributed much to the interest of our visit. Among the many interesting exhibits was that of Professor McArthur, who demonstrated some fine results, including a pregnancy following transplantation of ovarian homographs. Professors McKenzie, Berry, and Osborne are adding greatly to our knowledge of comparative anatomy, especially of the nervous system and the gastro-intestinal tract, by dissections of some of the most ancient animal life now extant. It is interesting to note that the small Australian bear, which lives on the leaves of the eucalyptus tree, has only rudimentary adrenal glands. This fact may have a bearing on adrenal deficiency disease.

The American visitor to New Zealand and Australia receives the most cordial welcome from these kindly people, who represent the

purest strains of the Anglo-Saxon race. Immigration is confined exclusively to the white race. W. J. MAYO.

UNITED FRACTURES AND THE MASSIVE BONE GRAFT

IF clinical and roentgen-ray examination of an ununited fracture discloses the fact that there is still attempt at repair, union may be said to be delayed, even if many months have elapsed since the injury. If, on the other hand, examination reveals no attempt whatsoever to form callus, though it may be but a few months since the injury, the fracture may be said to be in a state of non-union. Until this differentiation is generally recognized, there will continue to be a diversity of opinions with regard to the treatment of ununited fractures. Certain surgeons maintain that freshening the ends of the bone, drilling holes, applying metal or beef-bone plates, and so forth, will induce union in ununited fractures, while others insist that bone grafting is the method to use. The fact is that the former have in mind delayed union, the latter, their experiences with non-union.

If a group of patients with ununited fractures, that is, from delayed union and non-union, were treated by any operative procedure except bone grafting, a fair percentage would obtain union, but if the results were investigated further, most of the failures would be found in the non-union group, whereas most of the successes would be found in the delayed union group. Union may be induced comparatively easily in the cases of delayed union, but in those of non-union a fixed condition is being dealt with, and union must be created rather than induced.

Therefore, when the status of the fractures is that of non-union, bone grafting is the method of choice. If the fragments in the roentgenogram show a marked degree of osteoporosis due to lack of use and prolonged fixation, the operation should be deferred until this has been overcome by active motion and use of the part.

The graft should be autogenous and large, and abundant contact of the graft to the fragments should be obtained. The massive graft fulfills these requirements. The term massive graft is used to distinguish it from the inlay and the intramedullary grafts. This type of graft is applied as one would apply a metal or beef-bone plate, care being take first to pare down the cortex of the fragments so that a broad contact is obtained of the deep vascular layer of the cortex in both fragments to the deep vascular layer of the cortex in the graft, the medullary fat having been removed from the latter. After the ends of the fragments are properly freshened and shaped, they should be brought firmly together and then the massive bone graft applied and held firmly by using heterogenous or autogenous screws. It thus acts as a strong internal splint as well as an autogenous graft. In the process of absorption and replacement which takes place in every bone graft, a "weak" point is reached, and at that time, if the bone graft is small, the laying down of the new bone is not sufficient in quantity to stand any marked strain. The larger the graft, the greater the amount of this new deposit, and a fracture of the graft is not of much consequence, the callus taking on the splinting duty of the graft.

If this distinction between delayed union and non-union is borne in mind, and the massive graft with its more or less exacting technique used, particularly for the latter condition, a higher percentage of good results will be obtained in the treatment of ununited fractures. M. S. HENDERSON.

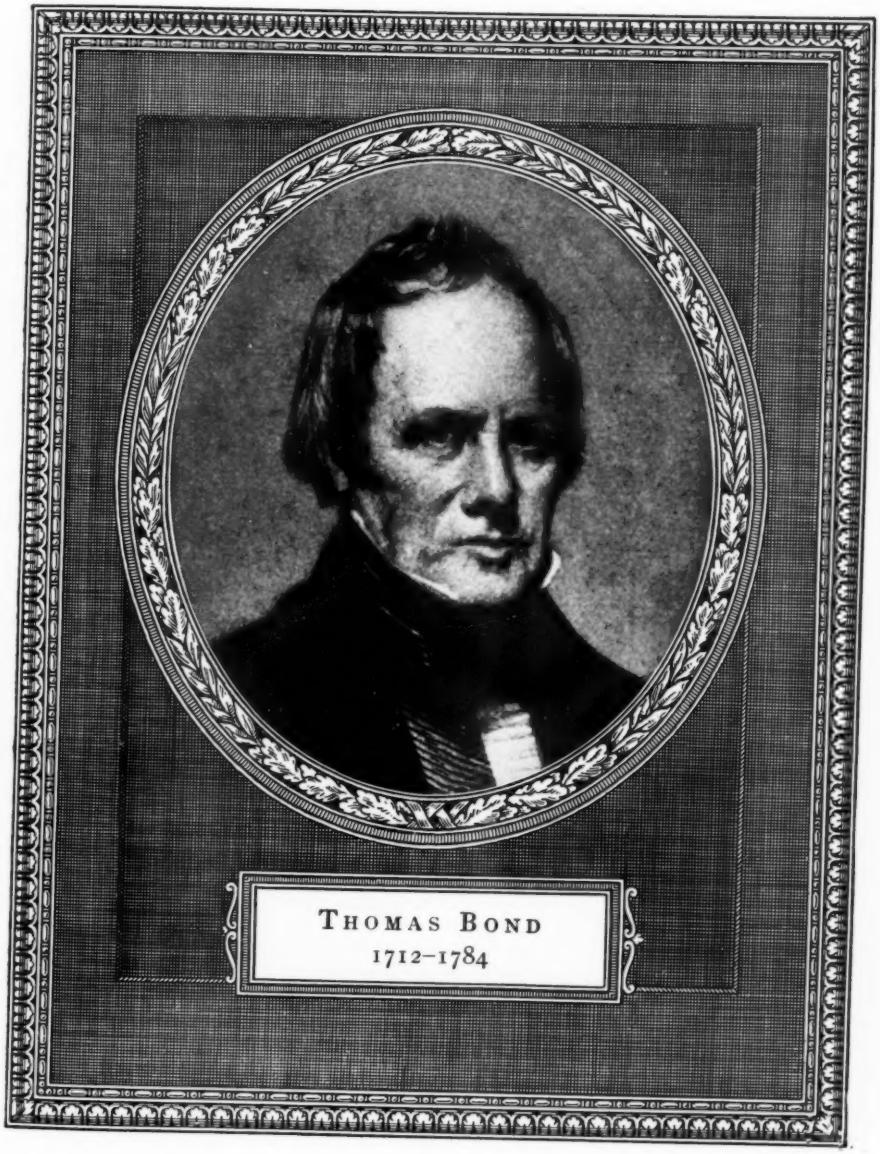
MASTER SURGEONS OF AMERICA

THOMAS BOND

THOMAS BOND, son of Richard Bond and Elizabeth Benson Chew Bond, was born in Calvert County, Maryland, in 1712. We have little account of his early years, except that he studied medicine under Dr. Hamilton, of his native county, and then went to Europe, studying chiefly in Paris. Upon his return to America, he settled in Philadelphia and began practice in 1734. He soon took high rank as a surgeon as well as a physician. He was particularly distinguished for his skill in lithotomy. He was apparently the first in America to perform this operation, there being a record of such a procedure in 1756, four years previous to the operation by Doctor Jones, of New York, who is credited with this honor. Doctor Bond's dexterity is attested by a quotation from a letter written in 1772, by a layman, which says: "I had the curiosity to be present at the hospital, at Doctor Bond's cutting for stone, and was agreeably disappointed, for instead of seeing an operation, said to be perplexed with difficulty and uncertainty, and attended with violence and cruelty, it was performed with such ease, regularity and success, that it scarcely gave a shock to the most sympathizing bystander, the whole operation being completed, and a stone, 2 inches in length and 1 in diameter, extracted in less than 2 minutes." "If," adds the writer, "surgery is productive of such blessed effects, may we not with Cicero justly rank it among the first of arts, and esteem it worthy of the highest culture and encouragement?"

The credit of originating the Pennsylvania Hospital is sometimes given to Benjamin Franklin, but he himself asserts that the suggestion came from Doctor Bond, and we find in the history of that period several such statements as this:

"The foundation of hospitals among us produced the most important effects on the character of the medical profession, and forms a great era in our progress. The Pennsylvania Hospital, the first of these institutions established in the country, was erected principally by contributors of the benevolent citizens of Philadelphia, though aided by a grant of two thousand pounds from the Colonial Assembly, and received its charter in 1751. Its establishment, as has been already stated, was owing to the suggestion of a physician, Dr. Thomas Bond. Up to the period of its foundation, no college of medicine existed on the continent, and the hospital, under the care of some of the first medical men of the period, early attracted the attention of both physicians and students, and very materially con-



THOMAS BOND
1712–1784

tributed to the advancement and distinguished position attained by the medical school which was soon afterwards begun."

When the Medical School was originated, it was decided to ask Doctor Bond to give a course of clinical lectures; the first regular lectures of the kind ever given in America. It is asserted that he had a regular class of thirty students in 1766, the first year. He began these lectures with these remarks:

"I am now to inform you, gentlemen, that the Managers and Physicians of the Pennsylvania Hospital, on seeing the great number of you attending the School of Physic in this city, are of the opinion, this excellent institution likewise affords a favorable opportunity of further improvement to you in the practical part of your profession; and being desirous it should answer all the good purposes intended by the generous contributors to it, have allotted me the task of giving a course of clinical and meteorological observations in it, which I cheerfully undertake (though the season of my life points out relaxation and retirement rather than encumbrances), in hopes that remarks on the many curious cases that must daily occur amongst an hundred and thirty sick persons collected together at one time may be very instructive to you. I therefore purpose to meet you at stated times here, and give you the best information in my power of the nature and treatment of chronical diseases, and of the proper management of ulcers, wounds, and fractures. I shall show you all the operations of surgery, and endeavor, from the experience of thirty years, to introduce you to a familiar acquaintance with the acute diseases of your country; in order to which I shall put up a complete meteorological apparatus, and endeavor to inform you of all the known properties of the atmosphere which surround us, and the effects its frequent variations produce on animal bodies; and confirm the doctrine by an exact register of the weather, and of the prevailing diseases, both here and in the neighboring provinces; to which I shall add all the interesting observations which may occur to private practice, and sincerely wish it may be in my power to do them to your satisfaction."

It is stated in several places that, by virtue of the fact that he delivered the first clinical lecture in the United States at the Pennsylvania Hospital on December 3, 1766, Dr. Bond may be called the Father of Clinical Medicine in the United States, if not in America.

When a petition to the Assembly to establish the Pennsylvania Hospital was read, it was pointed out that the salaries to doctors would consume all the appropriation; whereupon three members of the medical profession, Doctors Lloyd Zachary, Thomas Bond, and Phineas Bond, his brother, offered their services gratis for three years.

Dr. Bond was elected a member of the First Board of Contributors of the Hospital, but resigned at the end of a year to devote his time entirely to the Medical Staff. Dr. Bond was one of the founders of the College and Academy

which afterward became the University of Pennsylvania. He was elected a trustee in 1749 and remained such to the time of his death.

He was also one of the original members of the American Philosophical Society and was elected vice president, a position which he occupied as long as he lived, Benjamin Franklin being the president during this entire period.

Accounts are given of several articles published in medical journals, some of them being the relation of interesting cases which he encountered in his practice. There is also an account of a paper read before the Philosophical Society on "The Rank of Man in the Scale of Being and the Conveniences and Advantages He Derives From the Arts and Sciences."

The *Standard History of the Medical Profession of Philadelphia* (page 434) states: "The earliest invention by a Philadelphian of which we have been able to find any record was the Bond splint, invented by Thomas Bond for the treatment of fractures of the lower end of the radius and still much used for the purpose." He also invented an œsophageal forceps for the extraction of foreign bodies from the œsophagus.

Clinton Street, Philadelphia, was at one time named Bond Street as the result of a resolution passed at a meeting of The Contributors of the Pennsylvania Hospital. "On motion, it was unanimously resolved that the twenty feet street intended to be laid out as stated in the preceding resolution shall be named Bond Street in grateful recollection of the early, long, and faithful services of Doctors Thomas and Phineas Bond as physicians to this institution."

At the outbreak of the Revolutionary War, Dr. Bond, then past his sixtieth year, tendered his services to his country in a letter dated December 4, 1776; this letter being addressed to the Committee of Safety. This received a favorable response and both Dr. Bond and his son rendered distinguished services to the American cause by taking an active part in the organization of the medical department of the Army.

Dr. Bond was a delicate man, having, according to accounts, a tendency to pulmonary tuberculosis, but by unremitting care of his health, he lived to reach the age of 72.

On a tombstone in Christ Church burying-ground, we find this inscription:

> "In memory of Thomas Bond, M.D. who practised Physic and Surgery with signal reputation and success nearly half a century, lamented and beloved by many, respected and esteemed by all, and adorned by literary honors sustained by him with dignity. He departed this life March 26, 1784. Aged 72 years."

It is a pleasant coincidence to find, as an introduction to Morton's *History of the Pennsylvania Hospital*, a poem of a little later date by another distinguished Marylander, Francis Scott Key:

ON VISITING THE PENNSYLVANIA HOSPITAL

"Whose fair abode is this? Whose happy lot
Has drawn them in these peaceful shades to rest
And hear the distant hum of busy life?
The city's noise, its clouds of smoke and dust,
Vainly invade these leafy walls that wave
On high around it, sheltering all within,
And wooing the scared bird to stay its flight,
And add its note of joy to bless the scene!
The city's toils, and cares, and strifes are, sure,
Alike excluded here—Content here smiles
And reigns, and leads her vot'ries through the maze
Of flower-embroidered walks to bowers of bliss!
O! 'tis a sight to warm the heart of him
Who feels for man, and shares the joys he sees."

WALTER D. WISE.

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD DECEMBER 21, 1923, DR. CHARLES S. BACON PRESIDING

A CASE OF FIBROMYOMA OF THE OVARY ASSOCIATED WITH UTERINE FIBROIDS

DR. CAREY CULBERTSON: The specimen here presented consists of a uterus and its appendages. The uterus is small, atrophic, and contains several small fibroid growths. Its cavity measures 1¾ inches in depth and the mucosa is atrophic. One small fibroid growth was removed from the right round ligament. The left appendage is normal. The right tube is 8 inches in length, is closed, and is stretched about the circumference of the right ovary which is represented by a fibroid mass 20 centimeters in its greatest diameter. The center of this growth is cystic and the microscopic sections show it to be a fibroma.

This specimen was removed from a negress 40 years of age who came into the hospital complaining of a swelling in the left lower abdomen and a sensation of weight and dragging in the left side. These symptoms were of 2 months' duration, with occasional vomiting. There had been no loss of weight or strength. The menses were established at 14 years of age, were regular in periodicity, of 3 days' duration, and free from pain. The patient had never been pregnant.

Upon examination the abdomen was protuberant, rounded, obese, with a firm elastic wall distended by a large, hard, irregular mass rising from the pelvis and ballotable. The mass lay more to the right side, was movable, and rose as high as the crest of the ilium laterally but four handbreadths above the symphysis. The percussion note over the mass was flat, with tympany about it. There was evidently free fluid also in the abdomen. Vaginal examination revealed that no part of the larger growth lay in the pelvis, this cavity containing only the uterus and left appendages, the uterus being slightly enlarged, irregular, nodular, and free from the mass above.

Operation for removal of these tumors was uncomplicated, except for a partial adhesion of the omentum over the fundus of the ovarian tumor. The abdomen contains about 2 liters of free clear fluid.

DISCUSSION

DR. ARTHUR H. CURTIS: I would like to know why Dr. Culbertson calls this a fibroid rather than a desmoid. He also speaks of a small desmoid.

DR. N. S. HEANEY: What was the previous operation? In reporting the case of fibroma of the ovary Dr. Culbertson mentioned that the tumor was ballotable and there was ascites. Sixty per cent of ovarian fibroids have ascites. I wonder if he has run across any explanation why such tumors are associated with ascites in such a large percentage of cases.

DR. CAREY CULBERTSON (closing the discussion): Desmoid tumor, as I understand it, has come to be applied to the fibrous connective tissue growths developing in the musculature of the abdominal wall. Sections show that this tumor is made up of fibrous connective tissue. The muscle bundles of the recti were in intimate connection with the tumor and had to be cut away from it.

In answer to Dr. Heaney, the patient stated that the previous operation was for a fibroid tumor of the uterus. The uterus was still present, so there had not been a hysterectomy.

In answer to the second question, the cause for the ascites is unknown. The explanation usually given is that, being a tumor in the abdomen where there is peritoneal friction or irritation, excessive secretion is apt to occur. We find free fluid sometimes with fibroids of the uterus, and often in pelvic inflammation. In this particular case there were two liters of fluid, more than is usually seen in the presence of a benign growth.

A CASE OF LARGE FIBROID TUMOR (DESMOID) OF THE ABDOMINAL WALL

DR. CAREY CULBERTSON: This specimen consists of a large fibroid mass somewhat irregular in shape but approximately 12 by 16 centimeters in diameter, composed of multiple nodules. There is also one small separate fibroid growth.

The growths were removed from a negress 26 years of age who complained of discomfort in the lower abdominal wall and its protruberance. The swelling began as a hard mass the size of a hen's egg 6 months previously and had rapidly increased in size. The patient had had two children and 2 years ago a laparotomy had been performed for some pelvic condition. Since this operation the menstrual periods continued regularly, of 3 days' duration, scanty, and free from pain.

Upon examination the abdominal wall was rounded and distended prominently by a hard, nodular mass fixed in the substance of the wall and grooved mesially by the scar of a former section. Vaginal examination showed the small upright uterus to be apparently free from the abdominal wall and the growth in it.

Upon operation the mass proved to be a multinodular fibroid free beneath the skin and separating the recti muscles widely, with the aponeurotic sheath above it. It appeared to have originated in the lower area of the old wound but was not continuous with the scar in the skin. The mass projected deeply into the abdominal cavity where it took on a peritoneal coat. The omentum was densely adherent over the upper portion of the growth with many large blood vessels passing across. To the lower portion the ileum was adherent in a rosette of three loops. A second small desmoid, the size of a walnut, lay in the fascia on the right side between the fibers of the rectus and external oblique muscles.

The appendix was not present. The uterus was small and buried in adhesions beneath the bladder. The tubes and left ovary were absent.

DISCUSSION

DR. J. B. DE LEE. I recall two cases of partial rupture of the rectus muscle following laparotomy. The hæmostasis at operation was ideal but the violent vomiting afterward produced a break in the muscles with the formation of a hæmatoma and all the signs of peritonitis. This is important from the viewpoint of the differential diagnosis of postoperative peritonitis.

DR. ROBERT B. KENNEDY: I saw a hæmatoma of the rectus muscle in a patient, 20 years of age, who had suffered from influenza 6 weeks previously. There was a tumor mass, 6 centimeters in diameter, below the umbilicus and to the right of the midline. At operation the mass was found to be an abscess of the abdominal wall below the fascia. Culture showed streptococci. The patient gave a history of continued coughing during the influenza attack and the coughing may have produced a tear in the muscle with rupture of a vessel. A hæmatoma formed which later became infected and the resulting abscess formed.

ADENOMYOMA OF THE RECTOVAGINAL SEPTUM

DR. MARK T. GOLDSTINE and DR. SAMUEL J. FOGELSON contributed a joint paper entitled, "Adenomyoma of the Rectovaginal Septum." (See page 753).

DISCUSSION

DR. ARTHUR H. CURTIS: This is a very interesting subject and the paper has been very ably presented. Dr. Sampson, I believe, has not concluded that all these tumors have an intermediate growth in the ovary. He believes that the glandular tissue has origin either in the uterus or the fallopian tubes; sometimes the ovary is an intermediate host but sometimes the growth becomes implanted immediately. I somewhat doubt whether Dr. Goldstine has proved the point that these tissues arise as a result of inflammatory conditions. It would be interesting for us to hear a little more from him in substantiation of this point.

DR. CAREY CULBERTSON: Dr. Curtis has brought up a most interesting phase of this subject in his last remark, that is, whether these growths are inflammatory in origin or neoplastic. The German school represented by Meyer and Armann follow the inflammatory theory. Stevens reported a series of six cases in 1915, maintaining that these were true neoplasms, and Cullen later took the same position. Now there is very much the same situation in connection with similar growths developing in the tube, where we again have the development of the disease which is rather generally accepted as inflammatory. Such a growth is always found in a tube that shows inflammatory reaction throughout. It is noted in simple salpingitis as well as in the pyosalpinx. We, too, have adenomyoma in the tube in the absence of inflammation. Here it is accepted as neoplastic. Ectopic adenomyoma, while developing in the rectovaginal septum is also found in other portions of the pelvis, as Cullen has shown, even in the intestine, so that it is difficult to see how, as a result of inflammatory pressure, this growth would appear at such distance from the uterine cavity as it does. I am personally very much inclined to follow the teaching of Cullen and Stevens that, in the majority of cases, at least, it is neoplastic. It is easy enough to see why it was recognized in the early days as inflammatory, because there are always adhesions in the pelvis, especially in the posterior cul-de-sac. Adhesions may be due to a pre-existing peritonitis or to the development of adenomyoma in the posterior cul-de-sac, because the spilling of blood or material through the rupture of a perforating chocolate cyst of the ovary would naturally set up a plastic exudate. One of Dr. Goldstine's slides showed a definite round-cell infiltration which is indicative of inflammation. Another interesting thing about this was hinted at in Dr. Goldstine's remarks, that is the relationship between adenomyoma and malignancy. It is a remarkable fact that of all the adenomyomata that have been reported none of them has been shown to be malignant. There was not a single malignancy in Stevens' series; there was none in Cullen's, none in McCarty's. That is in line with adenomyoma generally. I have seen several cases of adenomyoma of the ovary, all of them benign, and several of the uterine wall, all of them benign. Another interesting point is that developing in the rectovaginal septum they involve the rectal wall but never involve the rectal mucosa. Several of Stevens' cases and Cullen's cases demonstrated this fact. Therefore there is no rectal hæmorrhage, as a symptom, to cloud the issue and suggest rectal carcinoma.

DR. MARK T. GOLDSTINE (closing the discussion):

Regarding the etiology of the lesion I feel that Robert Meyer's theory is the best, because it is logical and he has something to work on. Lockyer's explanation of epithelial heterotopy or invasion is that the misplaced condition is there because the epithelium has invaded the muscle; muscular tissue is not essential to the process. Any epithelial infiltration following an inflammatory injury will penetrate the soft tissue and often in its process of repair the epithelial tissue runs riot and branches out and you have a branching glandular growth. If this branching out of the epithelium takes place in muscular tissue the result is an adenomyoma. If, for instance, the invasion of the epithelium was solely into fibrous tissue you would have a fibroadenoma but the underlying factor is one and the same in both cases, that is you have an epithelial repair which goes on to excess until it becomes a pathological growth. In our cases we found definite evidence of inflammation. In one case we stained particularly for plasma and mast cells because there were no other signs of inflammation.

GRANULOMA INGUINALE

Dr. Sydney S. Schochet contributed a paper entitled, "Granuloma Inguinale." (See page 759).

DISCUSSION

Dr. Mark T. Goldstine: I would like to ask Dr. Schochet whether these Donovan bodies are hard to demonstrate. If they are hard to demonstrate that probably accounts for the lack of reported cases. If we find these bodies in an ulcer and it does not respond to treatment would you consider them Donovan bodies or consider it a therapeutic failure? If I understood the doctor right he said they could be confused with syphilis. Would you consider Donovan bodies in a case of syphilis with a typical ulcer if the case did not respond to treatment with tartar emetic? I believe it can be associated with syphilis and may resist the ordinary treatment, that is, the specific treatment.

Dr. William McIlwain Thompson: I have seen one case which answers this description. About a year ago a man came to me with a small papule in the right groin and with the inguinal glands considerably enlarged. This was opened and curretted, as it seemed simply an ordinary infection. The man had a history of syphilis though the Wassermann was negative at that time. He said he had been under treatment for several years. He then went south to a physician who had taken care of him when he had syphilis. The physician was kind enough to forward reports to me and I followed the case and saw him on his return to Chicago. Donovan bodies were found. The man returned to Chicago last summer, in July. He was not under my care but I saw him in consultation. He had an enormous granuloma of the right groin extending from the anterior spine to the scrotum. At my suggestion the treatment which had been given him in the south was continued. This was the tartar emetic but I do not think it was given very carefully. After each injection he complained of a severe reaction and the treatment was finally discontinued. I suggested radium but that was not given. An attempt was made to remove the granulation area entirely. It then involved the inguinal region on the right side, the scrotum, and extended almost down to the rectum. This was against my advice because I thought the prognosis was so bad that no amount of surgery would do any good. At the operation a portion of the scrotum was removed, the right testicle and as far as possible the entire growth. The patient was severely shocked but recovered. I again suggested the use of tartar emetic but the other physicians differed and he was continued under such local antiseptic treatments as we use in ordinary infections. Radium was then applied but the only result was a large slough which continued to progress. I am sorry that I was not in a position to study the case myself. I saw it only a few times in consultation. The man died yesterday and presented the extreme picture that has been shown here in this paper this evening, of granuloma inguinale.

Dr. Carey Culbertson: I have seen two cases of this disease, one in my own ward and one in the venereal ward at the County Hospital. Both of these were in the female. I agree with Dr. Schochet that it is without any question much more common than the report of the cases would show in this country. I believe that there are one or two cases every year in the venereal ward in the County Hospital. The case which was in my ward was treated by intravenous injections of a solution of tartar emetic and we thought for a while that there was some improvement but finally decided there was not. The case did not remain under observation for a long enough period of time to continue the treatment effectively. As the Doctor said, it is extremely resistent to any form of treatment but the important thing from a clinical point of view is that this condition must be recognized as an entity and not confused with syphilis or regarded as a broken down elephantiasis, as tuberculosis, or as some of the ulcerations with œdema, such as we see following ordinary infection. It is, however, not a surgical lesion and surgical excision would in all probability be followed by extensive sloughing and the production of a worse condition than that presented by the initial lesion.

Dr. J. P. Greenhill: I would like to bear out what Dr. Schochet said regarding the incidence of this disease. During 1919 and 1920 I saw six cases in the Gynecological Out-Patient Department of the Johns Hopkins Hospital. Sections were made for diagnosis, but no tubercle bacilli or spirochætæ were found in any of the sections. All the patients were referred to the department of syphilis and extensively treated, some with temporary improvement but none permanently cured. Dr. Culbertson is right when he says the lesion is not one for operation; for the one patient who was operated upon

(by Dr. Cullen), had a recurrence. Five of the six patients were colored and all had had the disease for a long time.

DR. ARTHUR H. CURTIS: We had a somewhat similar experience at Camp Pike, Arkansas. This Camp was more or less of a filter for venereal diseases and at one time there were 5,000 people with venereal infection. During my time there we encountered 10 or 12 patients with this disease.

DR. ROBERT B. KENNEDY: A case occurred in Harper Hospital, Detroit, in 1921. This was in a white adult male. The case was treated with antimony and cleared up.

DR. A. F. LASH: In regard to the case Dr. Culbertson mentioned, I was interne on the service and gave the treatment. I gave 2 cubic centimeters of a 1 per cent solution and increased the amount up to 14 cubic centimeters without producing any bad results in the patient but without producing any good results. After about 2 months' treatment the patient became discouraged and left the hospital.

DR. S. J. FOGELSON: While I was at the County Hospital during 1922 and 1923 in the men's surgical and genito-urinary wards we had two similar cases which were treated with solutions of tartar emetic but which failed to respond. On the suggestion of Dr. Edward Oliver we applied locally iodoform dissolved in ether and promptly cleared up both cases.

DR. SYDNEY S. SCHOCHET (closing the discussion): There were so many questions asked that I will try to answer some of them. In reply to Dr. Goldstine, I would call a case granuloma inguinale unless Donovan bodies were found. The second point is whether we can have syphilis and granuloma inguinale in the same patient. There are cases reported with positive Wassermann and there are cases which must be classified as syphilis instead of granuloma inguinale. I think those cases that give a positive Wassermann in which there is a doubtful finding of Donovan bodies should be classified as syphilis rather than granuloma inguinale. The third question, whether these two conditions can be found together, I do not know. I presume a patient could have two different infections, just as one may have a broken arm and a broken leg. I have seen cases of yaws and syphilis in the same individual. They are cured by the same drug but they are different diseases. One dose of salvarsan will cure yaws but it will not cure syphilis. I think the sooner we get away from treatment as a means of diagnosis the better our medical literature will be.

The question asked by Dr. Thompson, I believe, referred to the limiting of treatment to drugs. We have a specific in tartar emetic. We also have a very good synthetic preparation, the tri-amid of antimony which was prepared by Dr. Abel some 12 years ago. I think if we would persist in the intravenous treatment the results would be better with medicine than with surgery. Whether surgery is justified I am not in a position to say.

As Dr. Culbertson says, granuloma inguinale is more common than diagnosed and I think we ought to study these cases more thoroughly. I am glad to hear that the cases are being recognized. It is important to diagnose these cases because once a source of infection is established it is difficult to eradicate it.

Dr. Curtis mentioned the fact that it is very prevalent in the south. I can vouch for that. We have all types of tropical disease in the south. This disease is very prevalent in the south but unfortunately is not always recognized.

Regarding the failure of treatment referred to by Dr. Lash it is possible that the solution was not properly prepared. I would like to ask the doctor if the solution was boiled.

DR. LASH: Yes.

DR. SCHOCHET: That accounts for it. If you give more than one-tenth of a gram of tartar emetic which is boiled the patient as a rule complains of severe pains in the arms and in the chest. I do not like to make this remark but I think you were giving decomposed tartar emetic. When you realize the chemistry of tartar emetic you will not boil it just as you would not boil salvarsan. Whether iodoform or ether are good drugs to use I do not know. Ether is a good solvent for fats. I think some brilliant results have been obtained with ether in the peritoneal cavity. This has been thoroughly reviewed by Dr. Tarnowsky. I think we should limit our treatment to tartar emetic or some of the synthetic preparations.

DR. CURTIS: What about sterilization by heat?

DR. SCHOCHET: Any heat will break up the tartrate in solution and produce a toxic substance.

At the request of the president Dr. Carey Culbertson read a sketch of the life of Dr. Wylie, the noted gynecologist who died recently. Dr. N. S. Heaney asked why this matter was presented to the society. Dr. Bacon replied that it seemed proper in some way to acknowledge the death of prominent members of the gynecological profession.

The president announced that since the last meeting the official stenographer of the society, Mr. William Whitford, had passed away. Dr. Carey Culbertson moved that the secretary be instructed to place a notice of Mr. Whitford's death on the minutes of the meeting and to forward a letter of condolence and sympathy to the family. The motion was seconded and carried.

Dr. Rudolph Holmes announced that Dr. Horatio R. Storer, an honorary member of this society died about a year ago, and the Secretary was instructed to write a letter to his son who is now living in Boston.

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J. BROWN, M.D., F.A.C.S., Omaha

SURGERY TRANSLATED FROM GREEK INTO LATIN, INTERPRETED BY VIDUS OF FLORENCE, WITH SOME COMMENTARIES BY THAT SAME VIDIUS

THOUGH Jerome of Brunschwigk and Hans von Gersdorff in Germany had made many advances in surgery and published their methods and results, the knowledge was slow to spread, and still more slow to be accepted by the medical men of the time. In Italy surgery during the early part of the sixteenth century was still being practiced according to the Hippocratic and Galenic methods which had been handed down by imperfect and incomplete manuscripts on the one hand, and from generation to generation by personal teaching on the other. Berengarius of Carpi had made a few advances similar to those of the German surgeons and no longer believed that gunshot wounds were either burned or poisoned in which he followed the great Italian army surgeon Bartolomeo Maggi of Bologna. This same view was put forward at approximately the same time by Paré in France.

Vidus Vidius, more commonly known as Guido Guidi, was a Florentine surgeon of some note and of a very engaging personality, if we are to believe his great friend Buenvenuto Cellini. Through Guidi's friendship with his patron Cardinal Rodolpho he obtained access to a newly found Greek manuscript which the Cardinal had discovered. The manuscript contained in the most complete form up to that time the commentaries of Galen upon the surgical works of Hippocrates.

About this time Francois I of France recognized the necessity of improving the surgery in France, his attention being called to this necessity by the terrible mortality among his soldiers. As wars were almost continuous this constituted quite a drain upon the productive men of his kingdom. The king thereupon set about to find a surgeon who should establish and organize a course in surgery in Paris. The most prominent candidate in France for this position was Jean Tagault. Guido Guidi, however, carefully compared Cardinal Rodolpho's manuscript with those in Rome and translated it from the Greek into Latin. At the same time he added comments of his own upon those parts of Hippocrates' work which were not already covered by Galen. The king of France because of this work appointed Guidi Premier Medecin du Roi and lecturer on surgery in the Collège de France. The original manuscript was presented to the King by Cardinal Rodolpho, and Guidi went to Paris to take up his position and apparently to supervise the printing of the book for Buenvenuto Cellini writes in his memoirs: "I should, however, first take notice of my having acquired the friendship of one of the most learned and most amiable acquaintances that I ever had in my life. This was Signor Guido Guidi, an excellent physician and eminent citizen of Florence. . . . Signor Guido Guidi came to Paris while I resided in that capital. . . . . I conducted him to my castle, ... there were many habitations in it, occupied by several men of different trades, amongst whom there was an excellent printer. . . . . and it was he that first printed the excellent medical treatise published by Signor Guido." This refers evidently to Petrus Galterius who printed Guidi's work in Paris and brought it out in 1543. The book is entitled *Chirurgia e Graeco in Latinum conversa, Vido Vidio Florentino interprete, cum nonnullis eiusdem Vidii co(m)mentarius.* As was to be expected it was dedicated to Francois I, king of of France, and published with his consent as well as that of the Pope and the Duke of Ferrari in May 1543.

The work is confined to surgery and is practically a compilation of the knowledge of the then known treatment of wounds, fractures, and particularly those conditions due to war wounds. The authors discussed are Hippocrates, Galen, and Oribasius. On the portions of Hippocrates' work dealing with ulcers, fistulæ, and wounds of the head, there were apparently no comments by Galen, and Guidi gives his own views upon the conclusions of Hippocrates. Galen's commentaries on three of Hippocrates' books are then translated, namely: Fractures, Joints, and the Function of Medicine, the latter being more or less philosophical. Galen's own work on bandaging is then republished and finally Oribasius' work on knots and machines is shown. The directions for treatment are detailed and simple and the various instruments, bandages, and machines are beautifully illustrated by Francis Follat, a French engraver who also lived in the same castle as Cellini and Guidi.

Guidi held his position in Paris from 1542 to 1547 when he returned to Italy and later became chief magistrate of Pescia, for Cellini in his memoirs refers to him as holding that office. He died in 1659.

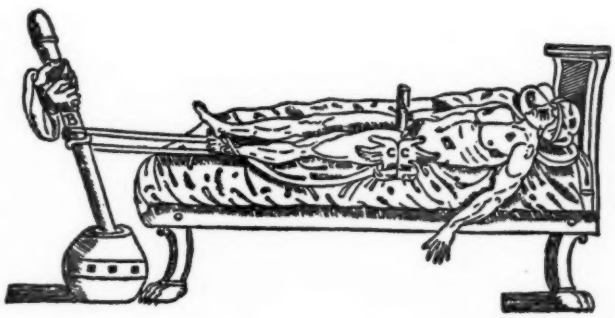
LXXVI

LXXVII

CXXV.

CXXVI.

A Lignum rotundum ac læue.
B Extenſio à pedibus.
C Repellens clunem à latere.



Idem quoque

REVIEWS OF NEW BOOKS IN SURGERY

IN the introduction of his book on *Surgery of the Spine and Extremities*, Taylor[1] states: "No attempt has been made to make the work encyclopedic, but an endeavor has been made to put into the hands of the reader a brief and useful textbook." On the whole the object has been accomplished. The first part of the book is given over to "Orthopedic Technique." This is probably the most valuable part of the book as the descriptions are accurate and the illustrations illustrate. It also deals with the use of apparatus in detail, and it is just these details that make the difference between efficient and non-efficient treatment. The second part deals with spinal affections and covers the subject completely, but in some points briefly. In the third part, on "Affections of the Extremities" all the most modern ideas are discussed.

The book is thoroughly up to date. The illustrations are numerous and for the most part well chosen. Many of the cuts are not of the best, so that the detail is poor. This is particularly true of the X-ray pictures.

B. H. MOORE.

A collection[2] of essays on orthopedic surgery is presented, taken from the writer's papers published between 1877 and 1898. There is, of course, nothing new in them and all orthopedists are already familiar with their contents for they are classics by one of the pioneers in orthopedics. One is therefore tempted to ask: "Why were they published?" There is enjoyable reading in them. They are models of accurate thought, and there is much sound common sense in them. They are of historic interest too. But to me the greatest pleasure in reading them has been because of the beautiful literary style in which they are written. It is vigorous, simple, direct, and therefore impressive. We are strongly reminded of Osler in this, and wish that literary style might have more of a place in modern medical literature.

B. H. MOORE.

BECK'S *Applied Pathology in Diseases of the Throat, Nose, and Ear*,[3] is a unique contribution to American otolaryngological literature. The author's aim, as he states in the foreword, has been to "apply pathological entities to etiology, symptoms, diagnosis, and prognosis and thereby arrive at a rational basis for treatment." The work is limited almost exclusively to the personal experiences of the author. It discusses not only the diseases of the nose, throat, and ear but also the acute diseases of the trachea, bronchi, and œsophagus, and the chronic affections of these parts. Most of the subjects treated in this volume are discussed fully, some with hardly sufficient detail. We wish at times that the author had given his reasons for the particular views he holds. The language is not always clear, and the Latin terminology not always correct. On the whole Dr. Beck has here produced an interesting and valuable work. It is printed on good paper and the illustrations are numerous and excellent.

G. A. TORRISON.

THE radium report of the Memorial Hospital of New York[4] contains in this edition a discussion of thirteen groups of malignancies in which it is believed that the technique and results will not soon materially change. Eleven members of the staff submit the report featuring the present status and scope of radium and X-ray therapy as viewed by Dr. William S. Stone and the late Dr. H. H. Janeway. The Muetter lecture from the transactions of the College of Physicians of Philadelphia, by Dr. James Ewing concludes the volume and presents a discussion of radiation therapy from the standpoint of extensive pathological study. Presentation is made of relative standing of various methods of general treatment of malignant groups giving technique, case reports, immediate and extensive follow-up results. Summaries and conclusions are given by the clinicians reporting each series. A résumé of the cancer problem in relation to radiation is ably presented by competent clinicians and pathologists. There is much repetition probably because of the fact that previously published material has been included with reports especially prepared for this volume. The report presents the results of careful work with an abundance of material extending over several years, and indicates a broad viewpoint and an earnest effort on the part of the authors to further what they believe to be a definite step forward in the treatment of malignant growths. Every medical man dealing with malignancies would profit by a thorough knowledge of this publication.

[1] SURGERY OF THE SPINE AND EXTREMITIES; A TEXTBOOK FOR STUDENTS AND PRACTITIONERS. By R. Tunstall Taylor, B.A., M.D., F.A.C.S. Philadelphia: Blakiston's Son & Company, 1923.

[2] SELECTED ESSAYS ON ORTHOPEDIC SURGERY. By Newton Melman Shaffer, M.D., F.A.C.S. New York and London: G. P. Putnam's Sons, 1923.

[3] APPLIED PATHOLOGY IN DISEASES OF THE THROAT, NOSE, AND EAR. By Joseph C. Beck, M.D., F.A.C.S. St. Louis: C. V. Mosby Company, 1923.

[4] Radium Report of the Memorial Hospital, New York. 2d s., 1923. New York: Paul B. Hoeber, Inc., 1924.

AMERICAN COLLEGE OF SURGEONS

AUSTRALIA AND NEW ZEALAND—A MEDICAL PILGRIMAGE

By FRANKLIN H. MARTIN, M.D., F.A.C.S., Chicago

ON February 8, Dr. and Mrs. William J. Mayo, Dr. Richard Harte, Dr. and Mrs. Richard R. Smith, Mr. and Mrs. J. H. Kahler, and Mrs. Martin and I sailed from Vancouver on the *S. S. Niagara* for a vacation pilgrimage to Australia and New Zealand. When we left our winter homes in Rochester, Philadelphia, Grand Rapids and Chicago, the temperature was coquetting about the twenty-below-zero point, and ice and snow abounded. Six weeks of the cold of the north temperate zone had seasoned and hardened us, and we felt that we had earned the right to look forward to tropical seas and the mild autumnal climate of the three island continents under the Southern Cross.

We were given a cordial greeting in Portland, Seattle, Tacoma, Vancouver, and Victoria, and were cheered adieu by our many medical friends who apparently envied us our long vacation.

We remained wrapped in our steamer blankets for several days after our departure from Vancouver. Then we began to replace our winter garments with lighter wearing apparel, and to enjoy our deck chairs, the exercise of the promenade deck, and the sports. On our arrival in Honolulu early in the morning of our eighth day out we were greeted by a group of surgeons, among them Dr. James Robert Judd, Dr. Forrest Joy Pinkerton, and Dr. Edwin D. Kilbourne, president of the local medical society.

HONOLULU, HAWAII

Our day had been delightfully planned and included a luncheon with the medical society at the country club. Our hosts gave us a wonderful bird's-eye view of the gem island. The United States has been very fortunate in its selection of outlying stations: Panama, Porto Rico, the Philippine Islands, and the Hawaiian Islands. Each and all remind one of decorations that might adorn the breast of some benevolent ruler.

THE SOUTHERN PACIFIC

Our foreign trip began when we left Honolulu. It is thrilling to leave this tropical paradise and strike into the broad Pacific to the southern hemisphere, where the calendar is reversed and the sun circles to the north.

FIJI ISLANDS

Particularly was it thrilling to realize that we were approaching the Fiji Islands, the lands that once bred cannibals. Suva, where we landed, has a beautiful harbor which is surrounded with the luxuriant feathery green of the tropics. The picturesque village is terraced on the hills, the red roofs of the houses lending a fine contrast to the deep green of the foliage.

We sped away by motor to the heights above the city, where we visited a hospital which has been erected recently as a memorial of the World War. Steel, concrete, and native woods have been utilized in the construction of this attractive and useful building which extends to a height of three stories. It is built with broad porches, which when viewed from without have the appearance of colonnades. A dispensary, the pharmacy, and dressing rooms occupy one wing. The lower floor is utilized for administrative offices, recitation rooms for medical students and nurses, and a large ward for male patients; the second floor comprises wards and private rooms; and a modern kitchen occupies a portion of the third floor. From the broad roofs, which extend on either side, one may obtain a fine view of the city and the harbor below, and of the border of lofty mountains beyond.

This war memorial hospital is performing a very useful work. In its school for nurses two types of pupils receive training: The white inhabitants and educated natives pursue a comprehensive three-year course, while the native Fijian and Indian women receive a short, first-aid course of one year's duration.

This hospital is also the center of a medical training school for educated Fijian and Indian men. A two-year course has been designed to train native physicians to do the routine work of caring for the people of the many islands in the Fijian archipelago. The fifteen students who are now training are a picturesque group, twelve of

them being Fijis and three East Indians. The Fijis with their heads of bushy black hair were in their native costume—a one-piece garment of white—with bare feet and legs. They are six-footers and look the real savage, bearing out our school-day impressions. The three Indians were much smaller, and looked quite ordinary beside their picturesque companions. Through the first-aid course for native nurses, and the short course for native physicians, the government has provided with wisdom for the care of this large population of islanders.

NEW ZEALAND—THE TWIN ISLANDS

In a brief sketch it is impossible to follow one's log and to detail the many interesting experiences and sights that were viewed. In making a bird's-eye survey of our visit to the southern continents of New Zealand and Australia, I shall have to content myself with a brief summary, and depend upon the future and another more suitable medium in which I may give a more amplified account.

I will touch particularly upon the medical societies, the hospitals, the medical schools and the people, and very briefly on sight-seeing and entertainments.

MEDICAL SOCIETIES

The annual meeting of the New Zealand branch of the British Medical Association, which we attended, gave us an opportunity to compare their national conferences with our own. There was an extensive program of papers in the three principal sections—medicine, surgery, and the head specialties.

The papers were not unlike those presented at the sections of the American Medical Association. They were practical and well written, and the readers presented them as their individual tastes dictated: Some of them read the entire paper, others made a formal presentation from notes. A peculiar feature of the discussions was the fact that a time limit seemed not to be enforced. However, those who entered into the discussions had made careful preparation, and they usually spoke from notes. The discussions were comprehensive and extremely interesting. There was a noticeable absence of the senseless habit of inflicting complimentary remarks upon the essayists, which so frequently prevails with us.

The opening general meeting, which was given civic and national recognition, was very formal, inasmuch as His Worship the Mayor of Auckland, J. H. Gunson, Esq., C.M.G., C.B.E., and His Excellency the Governor-General, Viscount Jellicoe, lent their presence and delivered speeches of greeting. The Minister of Health of the Federal Government, The Hon Sir Maui Pomare, made a short address The foreign guests, including the Australians, the United States representatives, and the British (the latter represented in the person of Sir J. Lynn-Thomas, K.B.E., of Cardiff, Wales) were given recognition. Special attention was accorded to the members of the medical profession from the United States by asking Dr. Mayo to respond to the greeting that was extended to our party, which besides our own group included Dr. Francis Patten Emerson, of Boston, and Dr. Thomas Hubbard, of Toledo. The retiring president, F. G. Gibson, M.A., M.D., M.R.C.S., of Christchurch, gave his address, and the incoming president, Carrick Robertson, M.D., B.S., F.R.C.S., of Auckland, read an interesting paper on the "Importance of Diagnosis in Surgical Diseases."

This opening function was held in the Town Hall, and there was an impressive gathering of the members of the British Medical Association, their wives, and a number of distinguished lay citizens. An interesting feature of the formalities was a procession of the platform guests and the wives of the speakers, and the civil officials who took part in the opening addresses. Following the formal program, supper was served in the adjoining hall and an informal reception was held.

In the principal cities we visited—Auckland, Wellington, Christchurch, Dunedin, and Napier in New Zealand, and Sydney and Melbourne in Australia—there are local branches of the British Medical Association which have an affiliation with the mother society, corresponding to our county medical societies. Similar societies are established in the other communities of importance in these two countries.

In New Zealand and Australia much interest was manifested in our American College of Surgeons and its program of hospital standardization. One morning of the Auckland conference of the British Medical Association was given over to the discussion of hospital betterment. I was asked to outline the program that the American College of Surgeons is carrying out in the United States and Canada. The subject was discussed by Dr. Mayo, Dr. Harte, several New Zealand and Australian surgeons, and Mr. William Wallace, the lay president of the Auckland Hospital.

At Melbourne, the medical society held a special meeting for the purpose of discussing hospital standardization, and to this meeting the local hospital representatives were invited. I was asked to present the subject in detail, whereupon Dr. Mayo, Dr. Harte, and Dr. Smith of our group

elaborated the program. A very lively discussion ensued, and through the many questions which were asked by local members of the profession we succeeded in making clear the comprehensive program which we are pursuing in Canada and the United States.

A similar meeting was held in the lecture room of the medical school at the university in Sydney. The same order of procedure was carried out, and the discussion which followed was even more acute than that at Melbourne. The hospital problem in these countries is one that is receiving much attention.

The medical societies tendered to us several formal and informal banquets. Their larger functions were much more formal than our own. The program is arranged with much care and certain individuals are selected to make formal toasts in introducing their speaking guests. Some of these introductions are elaborate and always carefully prepared, and while they are occasionally rather overpowering in their flattery, they are usually most interesting. At the large banquet given by the New Zealand branch of the British Medical Association at Auckland, the speech by Dr. J. S. Elliott, of Wellington, toasting the United States representatives, was of the highest type of oratory, and most flattering to our group. It would be read with absorbing interest by any United States citizen.

THE WORK OF DRS. ROYLE AND HUNTER

Dr. W. J. Mayo and I spent one afternoon in the experimental laboratory of Dr. John Hunter, the young Professor of Anatomy, University of Sydney, and Dr. N. D. Royle, Honorary Orthopedic Surgeon to the Lewisham Hospital and the State Children's Relief Board. Their work has attracted much attention here, dealing as it does with the influence of the sympathetic nerves in spastic paralysis. I felt immediately that our afternoon spent with these two young workers would have interested every surgeon of the world. They first showed us their microscopical specimens, and then led us to their experimental laboratory where they demonstrated their decerebrating operation on a goat, and the effect upon the muscles of the lower extremities as the result of severing the sympathetic nerve control by dividing the ramus communicans, which connects the spinal cord with the sympathetic ganglion. Later they took us to their lecture room and showed us several reels of films which demonstrated their experimental work and the result of Royle's surgery in spastic-paralysis cases.

Dr. Royle then took us to the Clinic and presented a dozen patients with spastic paralysis whom he had asked to present themselves. Everything we saw here impressed us with the importance of the work of these two young men, and the conscientious care with which they are carrying it out. Dr. Hunter, the anatomist, is not more than twenty-seven years of age, and his manner of presenting his work showed him to be of unusual caliber. Dr. Royle, the surgeon, is about thirty-five years of age, and has the respect and admiration of all of his contemporaries. These men will visit the United States in October as our guests at the Clinical Congress of the American College of Surgeons. Those interested in this epoch-making work may read the latest articles in the *Medical Journal of Australia* for January 26, 1924, on pages 77 and 86; the first, "A New Operative Procedure in the Treatment of Spastic Paralysis and Its Experimental Basis" by Dr. N. D. Royle, and the other "The Postural Influence of the Sympathetic Innervation of Voluntary Muscles" by Dr. John Hunter.

The same afternoon we were the guests of the Students' Club of the University at a gathering in the Great Hall, where several hundred had come to welcome us. The chairman, a young man, stated the occasion of the gathering. Professor John Hunter, whose guest we had been earlier in the afternoon, introduced us. Dr. Mayo and I each spoke briefly. We were received with great cordiality and the enthusiasm of our auditors was worth coming a long distance to witness.

HOSPITALS

In looking forward to my visit to New Zealand and Australia, I had anticipated with interest the pleasure I would derive from a comparison of their hospital system with that of Canada and the United States. The medical men of the world, especially those who travel, are almost unanimous in the belief that the most satisfactory system of hospitals is that which prevails in the United States and Canada—from the standpoint of serving the best interests of all patients, the well-to-do and the poor, and as well the best interests of the entire profession. It was our hope that the great island continents of the southwest Pacific, which have shown so much independence of action in the establishment and conduct of their governments, had exerted the same initiative in the organization of their hospitals by breaking away from the obsolete traditions of Europe. Alas, that is not true; but the medical profession of these countries, especially those who have observed hospitals else-

where, are fully aware that their hospital system is hampered by traditional drawbacks, and they are extremely anxious to work out a plan that will preserve all of the advantages of the old and obtain the advantages of the new. This must be done, too, they realize, with evolutionary rather than with revolutionary methods, and without incurring prohibitive expense.

I surveyed cursorily the hospitals in five of the larger cities of New Zealand, viz., Auckland, Wellington, Christchurch, Dunedin, and Napier; two cities in Australia, Sydney and Melbourne; one hospital in Suva, Fiji Islands; and one in Honolulu. Almost every general hospital in New Zealand and Australia is of the same type, viz., supported either by the governments, the states, the municipalities, and in some instances by more than one of these governing authorities. Like the great hospitals of London, these institutions are exclusively for the pauper poor, and for those who are able to pay a small fee for hospital care. The acting staff is known as the honorary staff. The members serve without compensation, nor are they allowed to receive fees from the pay patients of these hospitals. Each hospital is, as a rule, in charge of a full-time medical superintendent who cares for all emergency cases and has general supervision over the care of the sick. If the hospital is of sufficient size, he has one or more salaried assistants: a pathologist, an x-ray operator, etc. Each hospital has its own training school for nurses, with a competent matron and assistants in charge. The massive institutional architecture of most of the buildings dates back to the end of the last century. The later additions, as expansion demanded, are of a similar type of architecture, or very often of the conventional type of the period. As artificial heating is not a necessity, and as land was not a problem when the sites were selected, the grounds are ample, and the structures are of the pavilion type, connected by passage-ways which have roofs but are usually otherwise partially or wholly unenclosed.

The general hospitals of New Zealand and Australia, with the exception of the fundamental defects of organization referred to above, are of the standard type, and in equipment compare favorably with those of Canada and the United States. They have attending staffs of the outstanding men of the profession who conscientiously devote their time and skill to the care of the patients of the institutions. They do this without compensation, and with considerable sacrifice of time. As in London, their private work of a hospital nature must be done in a private hospital or "nursing home." The staff meetings, where developed at all, are rather in the nature of clinical society meetings than for the purpose of discussing the professional conduct of the hospital.

Each institution has a well-equipped laboratory with many of the latest refinements, some including up-to-date metabolic departments. These laboratories have full-time technicians, and in most instances a full-time paid pathologist is in charge. The X-ray departments are adequate, a few of them with apparatus for applying deep-ray therapy.

The records are well looked after, and in nearly all of the institutions clerks are employed who aid in writing and filing the reports. It is a definite responsibility of the internes to keep these records complete. Separate record findings for the various departments are required by almost all of the hospitals.

As no professional fees are collected from the patients in these large general hospitals, they are devoid of the abomination of fee division.

With the prevalence of general hospitals of the type described above, there is a definite demand for private hospitals in which patients of means may be treated by the doctors of their choice, and in which the patients are privileged to pay for professional services rendered to them. For that reason many small institutions abound which bear the name of the doctor who owns the hospital. Some of these private hospitals are reconstructed residences, with a matron (usually a trained nurse) in charge. Obviously these small institutions are dependent, to a greater or lesser degree, upon less adequate organizations than the general hospitals, especially in regard to laboratories, X-ray service, operating-room equipment, and a regular nursing organization, all of which are abundantly supplied in the general hospitals.

This anomalous state of affairs compels the most competent physicians and surgeons in the two countries to utilize private hospitals, some with inadequate facilities, and thereby places the conscientious man of the profession at a great disadvantage because he is unable without great effort and inconvenience to provide for his patients of means the same facilities that are accorded to the poor in the general hospitals. The people of means themselves are at an even greater disadvantage, as the private hospital is, consequently, a last resort for them instead of the haven of opportunity which is afforded by the hospitals of the United States and Canada.

As soon as the profession and the people of Australia and New Zealand learn of the inconsistencies and the difficulties which are the result

of this situation, they will do one of two things: Either they will allow their general hospitals to degenerate into purely pauper institutions by encouraging the building of more comprehensive private hospitals, or they will do what would be much more advantageous—combine with their large and expensive equipments of general hospitals, pavilions equipped to care for patients of means who may then pay not only for their hospital treatment, but also for the professional services which they receive from their physicians or specialists.

GENERAL HOSPITALS

NEW ZEALAND

The *Auckland Hospital*, one of the largest institutions in the two countries, contains 540 beds. Two hundred nurses are pursuing the course in the nurses' training school. The full-term nursing course occupies four years, but the students have the privilege of taking a licensing examination at the end of three years. The complete laboratory is in charge of a full-time pathologist. The records are comprehensive and are looked after by the heads of the several departments, the internes, the superintendent, and clerks. The medical superintendent has his home on the hospital grounds. This superintendent, Dr. Charles Evans Maguire, is a trained hospital executive of more than local reputation, full of ideals and obviously thoroughly conscientious. The hospital has several pavilions, including a children's department, and a luxurious home for nurses located on the grounds. The site is in a beautiful part of Auckland, and commands a fine view of the city and of the picturesque harbor.

The *Wellington Hospital*, which houses 320 patients, has a substantial building with several pavilions. It cares for the poor and other individuals of the country who present themselves. A small hospital fee is asked of those who can afford it. It is not permissible to pay a fee to any member of the attending staff. The honorary staff consists of four medical practitioners, four surgeons, one anæsthetist, and one genito-urinary specialist. There is a separate state maternity hospital. The Wellington Hospital has a part-time radiologist, and a part-time pathologist, each of whom have paid technicians. The house staff consists of a full-time medical man who does some clinical work but who cannot receive fees, and a superintendent, who has jurisdiction over an assistant superintendent and six house internes. The internes receive, besides their housing and board, £200 a year. The training school, which has a course of four years, is in charge of a matron who is a trained nurse. Automatically the graduates are licensed to practice anywhere in New Zealand. The bacteriologist of the hospital is a full-time official, and does work for practitioners of the country. He has six assistants. Records are well kept and take into consideration the work of all departments. There are get-together meetings of the house staff, but staff meetings of the type required by our minimum standard are not developed.

The *Christchurch Hospital*, with a 300-bed capacity, has several fine permanent buildings. An honorary staff is organized and the doctors are not permitted to receive fees. Either no fee, or a very small fee, is asked for hospital service. The well-equipped laboratory is under the supervision of a full-time director. The X-ray department is up-to-date, the operating rooms are thoroughly well equipped, and the records are kept by the internes. There are staff meetings, but not for the specific purpose of reviewing the professional conduct of the hospital. One hundred and twenty nurses are pursuing the three-year course of training. Dr. Fox, the chief, was our host on the occasion of our visit to Christchurch Hospital.

The *Dunedin Hospital* is virtually a part of the medical department of the Dunedin University. Its buildings are attractive and consist of several units which have a capacity of 300 beds. Dr. Falconer, the medical superintendent, is enthusiastic about his work, and was careful to explain in detail the conduct of his institution. There are eight house officers or internes who receive, besides maintenance, £100 the first year, and £150 the second year. The training school has seventy pupil nurses. A three-year course is required for graduation, but those who desire advanced training may take a graduate course of one year. Each nurse receives £10 for her outfit, and in addition £30 the first year, £40 the second year, £50 the third year, and £60 the fourth year. The records are not too comprehensive, but include bed-side notes, pathological findings, and the blood and urine records, which are worked up by the internes. The laboratory is in the medical school. The X-ray equipment is of the conventional type and is located in the hospital building. The operating rooms are well equipped and up-to-date.

The *Napier Hospital* is beautifully situated on a bluff overlooking the city and the sea, and has a capacity of 250 beds. It has a training school for sixty nurses, with a three-year course. This hospital is conducted on the plan of the other New Zealand institutions, with an honorary staff, free and small-pay patients, but no fees to physicians. The hospital site is capacious and several separate pavilions accommodate the different departments.

GENERAL HOSPITALS

AUSTRALIA

The *Melbourne Hospital*, the largest in that municipality, is centrally located and has a capacity of 400 beds. It is one of the few hospitals visited by us in the two countries with circumscribed grounds. It occupies one city block and is compactly built to cover the entire ground, with no room for expansion except in additional height. However, it is thoroughly equipped and has a large and enthusiastic staff. One of the interesting features of our visit here was our presence at a clinical meeting of the attending honorary staff with the house staff. Several patients were brought in and presented, and an animated discussion ensued. There was a very interesting, spirited, and critical play of words, give and take, between the internists and the surgeons. The hospital is a university institution where the 120 senior medical students receive their clinical instruction. It cares for free patients and those who pay a small fee. No fees are paid to members of the attending staff (known as an honorary staff), who are clinical teachers in the medical school. The well-equipped laboratories are under full-time directors; the X-ray equipment is thoroughly up-to-date, and there is a complete system of records. A large training school for nurses is connected with the institution.

The *Alfred Hospital*, of Melbourne, is one of the most complete and beautiful of all of the hospitals we visited. It covers a large plot of ground and is comprised of two and three story pavilions which are connected by long covered galleries. Its present capacity is 340 beds, but it is planned for 600 beds. The laboratories and X-ray departments are complete. This is a teaching hospital connected with the medical school, and conducts a training school for nurses with a capacity at present for ninety-two pupils. This institution is under the control of a board of managers, not unlike our own hospitals, and is partially supported by voluntary contributions, with a small grant from the government. Its staff meets once a month and conducts a clinical meeting. It has a fair system of records, and the patients are free and small pay, with no fees to the attending staff.

St. Vincent's Hospital, Melbourne, a Roman Catholic institution with a capacity of 120 beds, is conducted on the plan of the Alfred Hospital, viz., under private control with a small governmental grant. Also it furnishes teaching facilities to the University medical department. The free beds are supported by private philanthropies and by a grant from the government according to the number of state patients who are cared for. This institution is attractively located and evidently very well conducted. It has up-to-date laboratories, an ample X-ray department, and unusually attractive and well-equipped operating theaters. Its records, with a system of cross-indices, are comprehensive, and the record department is in competent hands. The training school for nurses, with eighty pupils, has a three-year course, the admission requirement being a grammar school education. There is an honorary staff and no fees are paid to physicians or surgeons by pay patients. This hospital is in close proximity to a private hospital, the St. Evans, which is conducted by the same order of nuns, and offers a solution to the hospital problem in Australia. I shall speak of this in considering private hospitals.

The *Sydney Hospital*, located on an elevated site with capacious grounds, is one of the institutions of the University of Sydney. It has a capacity of 350 beds and conducts a nurses' training school which has 130 pupils. The comprehensive records are in charge of a registrar and an assistant registrar. The laboratories of this institution are unusually complete and have a full-time pathologist, bacteriologist, and radiologist. The Sydney Hospital, which commands the best professional talent in Sydney, cares for free patients, and receives a small fee for hospital care from patients who are able to pay. No fees are paid to the attending staff for professional services.

The *Royal Prince Alfred Hospital*, of Sydney, one of the largest and most complete that we visited in Australia, is a teaching hospital affiliated with the University. This institution, which obviously is well conducted, made a favorable impression upon our group. It is attractively located, and its architectural appearance is satisfactory. It cares for the free patients and patients of moderate means who can pay for a part of the expense of hospital care. There is no provision for patients of means. The training school with its four-year service requirement has 200 pupil nurses. The pathological department is in charge of a competent pathologist, and apparently is well equipped. The records appear to be comprehensive, and are cared for by a full-time registrar.

The *Royal Alexandra Hospital for Children*, in Sydney, which was one of the most satisfactory special institutions that we had the privilege of visiting on our pilgrimage, is a most complete institution for the care of children. Privately conducted, with the genial founder, Dr. Charles P. B. Clubbe, still acting as president, it is supported by philanthropic contributions, with limited government grants for the care of free patients. The at-

tractive building on the two-story pavilion plan is beautifully located on spacious grounds, with room for expansion. It has a capacity of 340 beds, provides clinical teaching facilities for the University, and has an honorary and exclusive staff, as do all of the general hospitals in Australia. It has an up-to-date dental department, where nurses are instructed to do first-aid work on the teeth of children, and a training school for nurses in which 120 pupils are taking the four-year course of training. The operating rooms, the pathological department, the record department, and the X-ray department all appeared to be thoroughly satisfactory. A full-time mechanic and a shoemaker are employed to make shoes, splints, and other orthopedic apparatus. None but children are treated in this hospital.

The *Lewisham Hospital*, Sydney, is one of the few general hospitals of the two countries which accommodate on the same grounds a free government-grant institution and a private pavilion where patients of means may be cared for and pay for the professional services which they receive. This institution is conducted by the Blue Nuns, a Roman Catholic order, and provides 200 beds for the free general hospital department, and 100 beds for pay patients in the private pavilion. It has the usual records, conducts a large out-patient clinical department, and has recently installed an up-to-date X-ray apparatus. The Lewisham Hospital makes a very favorable impression and there is little to distinguish it from many of our best Catholic hospitals in the United States and Canada. In addition, it emphasizes the human aspect, which is always imparted by the woman's touch, and which so many hospitals lack. If the governments were to copy this institution in the conduct of their general hospitals, viz., add a department where patients of means could be treated as private patients, they would, in my opinion, establish an ideal system. This institution provides for free patients and those who can pay a small fee for hospital care, the professional services being given by the regular honorary staff; and in an isolated portion of the same building, with the same adequate equipment, the members of the honorary staff may care for their well-to-do patients and receive fees for the services they render. Here, too, patients of means may be provided with hospital service and be cared for by their own physicians or specialists.

St. Vincent's Hospital, of Sydney, is a general hospital (free and small-pay patients) conducted by Roman Catholic sisters. This hospital, too, has provision to care for a limited number of full-pay patients who may be treated on the plan which is carried out by private hospitals. It has 200 beds, and there are 108 pupils in the training school which provides a four-year course. It has its own laboratory, X-ray, and out-patient departments. While I did not have an opportunity to examine the records, I was informed that they were complete. The hospital receives governmental aid and its honorary staff gives clinical instruction to the students of the University medical school.

Hurried visits were made to two very creditable hospitals devoted to the treatment of women, the Queen Victoria Hospital, and the Woman's Hospital, both of Sydney.

PRIVATE HOSPITALS

New Zealand and Australia are provided with innumerable private hospitals. These range from small institutions of the grade of the "nursing home" located in old, remodeled private houses, to large, well-constructed buildings especially built for hospital purposes. Several of the best of these are under the jurisdiction of the Roman Catholic church.

Misericordia Hospital, Auckland, is a small institution of this type. It is beautifully located on a site overlooking the city and the harbor, and is conducted by the Sisters of the Sacred Heart. It has at present a capacity of 35 beds, with a plan for immediate expansion. Its laboratory work is done at the nearby Auckland Hospital. Its future of usefulness is fully assured, as several of the leading professional men of the city are utilizing its facilities.

The *Lewisham Hospital*, of Christchurch, is another institution conducted by nuns. It is a well-equipped private hospital of sixty-bed capacity. Recently it established a laboratory and installed an up-to-date X-ray department. Its records are fair, it has no internes, and the administration is exclusively in the hands of the nuns. It is one of the institutions for private work which is popular with the leading men of Christchurch. Our impression of the worth of this hospital was most favorable.

The *St. Evans' Hospital*, of Melbourne, touches a high-water mark as a de luxe institution for the care of pay patients. Architecturally and from the standpoint of furnishings it is very adequate and most artistic. With a capacity of 120 beds, it furnishes accommodations for individuals of moderate means, and luxurious apartments for people of wealth. Its laboratory and x-ray departments are conducted in conjunction with the general hospital, St. Vincent's, which is located in the adjoining block, and which is conducted by the same order of Catholic nuns. I have referred pre-

viously to this arrangement in connection with solving the problem of combining free and private hospitals. This advantage was illustrated for us here through the work of Dr. Devine, an eminent surgeon who does his teaching and charity work under auspices which enable him to render adequate service also to his private clientele. He has only to step from one pavilion to another, which is in close proximity, to perform his public service and his private practice under familiar environment and management.

The *Brae Side Hospital*, of Sydney, is an attractive private hospital with a capacity of 35 beds. It is in large grounds and it is constructed for comfort, with large outdoor porches upon which the beds of the adjoining rooms may be placed when desired.

The *Lewisham Hospital*, of Sydney, I have already referred to as combining the general hospital advantages with the facilities of a private hospital. It is conducted by the Blue Nuns of the Roman Catholic church. Its capacity is 200 free beds and 100 beds for people of means. Here, however, the advantage is marked, inasmuch as the two organizations are in one enclosure and under identical supervision. Cleanliness and good management are apparent. The accommodations for the poor and the wealthy are equally acceptable. The patients of means are privileged to pay for exclusiveness, and for the services of their own physicians for professional care.

The *War Memorial Hospital*, at Suva, Fiji Islands, marks a successful effort to build an up-to-date hospital in the tropics on a small island at the edge of civilization. I have already told of this attractive institution which is located on the heights overlooking the picturesque harbor of the island commonwealth. It furnishes accommodations for 80 patients in the three-story building which has been completed but recently. Besides the hospital accommodations, it has a thoroughly up-to-date out-patient dispensary. There is a training school for native nurses (a one-year course) which fits them to do first-aid work among the natives of the Fiji Islands, and also a training school for full-time nurses (a three-year course) to care for the Caucasian and other inhabitants of the islands. It is affiliated with the Fiji Medical School where native students are trained to practice medicine among their people. The hospital is under the immediate charge of an Englishman, Dr. P. T. Harper, who acts as superintendent. Dr. A. A. Montague, of Suva, is chief of the honorary staff, and the training school is under the able supervision of Matron Pankhurst, an English nurse. The provision for laboratory and X-ray departments, and the operating theaters are thoroughly adequate. It is an institution that will not suffer by a comparison with any hospital on the islands of the Pacific Ocean that we visited. It would be a credit to any community.

The *Queen's Hospital*, of Honolulu, is a new, well-equipped institution for private and free patients. It is supported by fees from private patients, philanthropists, endowments from private sources, and grants from the municipality of Honolulu. Dr. N. P. Larsen is the pathologist in charge, and Mr. George C. Potter is the superintendent; also it has a Board of Trustees. Its wards and private rooms (some of the latter luxuriantly furnished and with private toilets and baths) afford a capacity at present of 214 beds. The thirty-five pupils in the nurses' training school are Coreans, Chinese, Hawaiians, and Caucasians. The five internes are obtained from the best schools in the States. The hospital is equipped with every modern facility—an x-ray department with full-time technicians, and complete laboratories with a full-time director. The staff is a closed one, and meets once a week for consultation. The county pays $2.50 a day for the care of each of its county and city patients, and this is the only expense to the government for caring for its indigent, although it has all of the advantages of a general hospital. Patients of means are allowed to pay fees to their attending physicians and specialists.

MEDICAL TEACHING

We visited and inspected the medical teaching schools in three cities—Dunedin in New Zealand, and Melbourne and Sydney in Australia. Dr. Mayo touches upon medical teaching and other subjects in an editorial in this issue of SURGERY, GYNECOLOGY AND OBSTETRICS, page 833.

ENTERTAINMENTS

Everywhere we received a warm welcome and every hospitality that we had time to accept was ours to enjoy, whether tendered by the governments, cities, medical societies, universities, hospitals, or individuals.

We were fortunate to be guests of honor at a dinner in the Government House at Auckland, given by Their Excellencies the Governor-General and Viscountess Jellicoe of New Zealand. No one could fail to appreciate being entertained by this brilliant figure of the late war, the hero of the Battle of Jutland. He was most cordial in his welcome of our party of United States citizens. His Worship the Mayor, J. H. Gunson, Esq., and Councillors of Auckland entertained the members

of the British Medical Association in the Town Hall, where we were the guests of honor, and where Dr. Mayo responded to the Mayor's speech of welcome directed to the United States representatives. The Mayor's car was at our disposal while we were sojourning in Auckland. In nearly every city we visited we were entertained by the various civic clubs, including the Rotary Club and the various English-speaking societies. One or more, and sometimes all, of the men of our delegation were expected to respond to the toast to the American visitors.

In addition to the civil, governmental, and professional entertainments, we attended a delightful tea given by Mr. and Mrs. Kenneth Mackenzie at their home, "Waiaturua," in "the brush;" a harbor excursion and luncheon given by the Auckland Harbor Board and Auckland Hospital Board; a charming musicale at the residence of Dr. and Mrs. W. H. Parkes; and a beautiful out-of-door pageant, a "Rose Garden Revel" given at Cintra under the supervision of Mrs. Parkes. One of the most brilliant affairs of the conference week was the Presidential Ball, given by Mr. and Mrs. Carrick Robertson at Scott's Hall.

One of the features of the British Medical Association conference in New Zealand was an elaborate banquet which reminded the United States visitors of the good old days before our country chose water in preference to wine. Here it was easy to become eloquent and to enjoy the plaudits of congenial good-fellowship.

In Napier we were the guests of Mr. and Mrs. T. H. Lowry at their home, seventeen miles out, where we saw a sheep station in one of the great sheep-raising regions of the world. In the dinner that we enjoyed here we obtained some idea of the charm of this life where people of culture live close to nature and do things worth while.

Through plans made by our friends we enjoyed about six hundred miles of motoring in New Zealand. On the northern island we motored from Rotorua through the thermal regions and over three ranges of mountains to the sea at Napier, an experience that included unusual scenery, and a thrilling ride of nearly two hundred miles.

On the southern island we motored to Lake Wanaka at Pembroke and to Mount Cook, in the premier mountain range of New Zealand. These trips were most enjoyable as they gave us an opportunity to see much of the sheep and cattle raising industries, to see the people as they live on the far distant stations in the interior country, and, finally, it gave us time to contemplate and to rest from our arduous week of meetings and entertainments.

In Dunedin, in Christchurch, and in Wellington, our spare time was occupied with delightful private and semi-public dinners, luncheons, and teas. A ball at Sir Lindo and Lady Ferguson's, and afternoon tea at the country place of Dr. Frederick Ratcliffe Riley, with a motor ride over the mountains skirting Dunedin, were delightful features of the hospitality extended to us. On the last evening of our stay we were entertained by the surgeons and their wives at a delightful dinner and dance given at the Savoy Hotel.

Our visit at Christchurch was of brief duration, but most delightful. It included a breakfast with Dr. and Mrs. Philip Stanley Foster, and a beautiful drive over the hills for tea at the Kiwi Tea House, with a group of medical men and their wives. For dinner we were separated into small groups, Mrs. Martin and I dining at the delightful home of Dr. and Mrs. J. Gibson.

During our one day at Wellington the hospitality was boundless. A large dinner was given by Dr. James Sands Elliott, the editor of the *New Zealand Medical Journal*, and Dr. William Edward Herbert, the leading surgeon of New Zealand. Later in the same evening we were the guests of the English-speaking society.

Before closing my remarks on our entertainments in New Zealand I must not neglect to tell of the opportunity the government furnished us to see the native Maoris in the most advantageous way. A special train took the members of the British Medical Association from Auckland to Rotorua, one of the principal home centers of these interesting aborigines. These people, while many of them are now educated and cultured, retain many of their ancient customs, among others their traditional songs and dances. This was an unusual occasion, as the Maoris were called from far and near to reproduce for us a series of entertainments and dances similar to those extended to the Prince of Wales on his recent visit. By an impressive ceremony, which involved long speeches, the members of our group were enrolled in the different tribes and given various implements of warfare and peace. Dr. Peter Buck, a leading physician and a Maori, was the host. Dr. W. J. Mayo was made chief of a tribe, and given a robe of office and a staff of authority. The presentation was made by one of their beautiful maidens. This required that he enact with her the ancient custom of "rubbing noses," an impressive ceremony which caused envy on the part of less fortunate visitors.

AUSTRALIA

Upon our arrival in Australia we found that in addition to our sight-seeing and professional en-

gagements, our time was to be well filled with interesting functions, social and professional. In Melbourne, on the day of our arrival, the Lord Mayor and the Lady Mayoress (Mr. and Mrs. W. Bounton), gave us a reception at the Town Hall. Several hundreds were invited. The affair was formal, and ceremoniously associated with a tea. Toasts were drunk, and the Mayor formally welcomed each one of us in turn, and we were called upon to respond.

On the afternoon of March twenty-seventh, we were the guests of the English-speaking Union (Victoria Branch), held also at the Town Hall. It was a large and formal affair. Sir A. Robinson presided and made the opening address of welcome. Professor Osborne introduced Dr. Mayo, who in replying expressed our appreciation of the courtesies extended to us. Dr. Richard Harte of our party also made an interesting response. The Premier, Mr. Lawson, welcomed our new American Consul-General and his wife, who were also guests of honor on this occasion.

On the same evening the Council of the British Medical Association (Victoria Branch), and the Surgical Association of Melbourne, entertained the men of our party at dinner, and later in the same evening we joined the ladies at a reception given at 9 Downing Street. The Governor and Countess of Stradbroke, representing the Crown, entertained us at a formal dinner on Friday evening at the State Government House, Malverne. Saturday afternoon, under the immediate guidance of Dr. Dunbar Hooper, we were the guests of a group of surgeons and their wives in a forty-mile drive to Black Spur, a resort in the foot-hills, near which is a state reservation for the aborigine bushmen! Here we witnessed expert spear and boomerang throwing by the natives. Here, too, under the guidance of Dr. McKenzie, we saw many of the animals of Australia which are rapidly becoming extinct, and which show the embryonic type actually functionating. Saturday evening, reluctantly of course, we accepted under special arrangements ringside seats at an important boxing match at which Fox, a light-weight champion of England, worsted in an exciting twenty rounds one Fercoe, a light-weight favorite of Australia. The same evening the ladies of our party attended the opening night of the opera, presenting Madame Melba, who took the leading rôle in *La Boheme*. Thus was retained a seeming balance of culture.

Sunday morning Dr. H. B. Devine, one of the brilliant younger surgeons, took us on a bird's-eye exploration by automobile. We dined the same day with Dr. G. A. Syme, another of the distinguished surgeons of Australia, and later in the afternoon we met several hundred members of the profession and their wives at his charming home. On Monday we were the luncheon guests of the Prime Minister of Australia, Mr. Bruce, and his cabinet, at the Federal Parliament House. On our final day we were the guests of the federal librarian in the morning, and Dr. and Mrs. Mayo and Mrs. Martin and I lunched with the Governor-General and Lady Forster at the Government House.

Sydney was not a whit behind Melbourne in the entertainments provided for its guests. Wednesday evening we were the dinner guests of Dr. and Mrs. Ralph Lyndal Worrall at the Queen's Club. Thursday we were lunched by the Premier of New South Wales and the members of his cabinet at the State Capitol.

As guests of the State, we motored to the Blue Mountains and the famous Caves of Jenolan. The car provided for our use was a magnificent one, luxuriously accommodating fourteen people and their baggage. The trip required two days, and is one of the great sights that should not be ignored by ambitious travelers. The caves are approached by a picturesque mountain drive from the coast, through vineyards and sheep and cattle stations, to the foot-hills covered with summer homes, and, finally, into rugged mountains where lie the famous Caves of Jenolan, which are most wonderful and extensive. We were accompanied as hosts by Dr. Robert Hy Todd, the Secretary of the Australian branch of the British Medical Association, Dr. F. P. Sandes, professor of surgery in the University, and Dr. J. W. Lipscomb.

I cannot refrain from making special mention of the personal attentions that were extended by Dr. P. Fiaschi, which added much pleasure and comfort to our visit in Sydney.

On Monday we attended the meeting of the Rotary Club. On the occasion of the much anticipated visit of the British Fleet, headed by the great battleship "The Hood," we were guests of the Minister of State for the Commonwealth of Australia, on the *S. S. Burra Bra*. Later in the day we were transferred to small motor boats and became the guests of Drs. C. V. and R. S. Bowker. We sailed about the beautiful harbor, which was very animated on this fleet-day, and lunched on their boats on a little bay in a picturesque spot near "The Heads" opposite the city. On Monday we lunched *en famille* with Dr. and Mrs. R. Gordon Craig at their home overlooking Centennial Park. Immediately afterward we visited the magnificent Zoo with Dr. Todd, who more than anyone is responsible for its organization and existence. Besides containing a large col-

lection of interesting specimens, the Zoo occupies an outstanding and picturesque site on a rugged promontory overlooking the harbor opposite one portion of the city. Here we had tea, and returned by launch early in the evening.

Thus everywhere on the three continents we were official guests of the federal, state and civic governments, and were given flattering receptions by the medical societies, the hospitals, the universities, the civic clubs, and most markedly by the medical profession as organizations and as individuals. The women of our party were enthusiastically entertained at luncheons, teas, dinners, motor rides, theaters, and the opera. The warmth of hospitality of these people can never be forgotten by the pilgrims from the United States of America.

THE PEOPLE OF AUSTRALIA AND NEW ZEALAND

If a Royal Commission had been selected two hundred years ago to discover somewhere on earth ideal lands, with an ideal climate, with ideal topography, and with a diversity of resources, it could not have made a better selection than Australia and New Zealand to provide for a high civilization. These islands extend from the milder tropics through the temperate to the milder frigid zones of latitude. They have rich agricultural plains that will grow in abundance all sustaining foods; they have rolling hills on which to graze their cattle and their sheep; they have marvelous mountain ranges that furnish all varieties of minerals to the world, and that reproduce the scenery of Switzerland and the beauties of our own Rockies in Canada and the United States. They have thousands of miles of seashore, rugged and beautiful, with capacious harbors for commerce and long stretches of pleasure beaches that reproduce the charm of Brighton and Atlantic City. The islands are large enough in area to house an empire of people and to duplicate the wealth and culture of the United States or England; and they are isolated enough to make it possible to cultivate an independence that will rid them of the undesirable and antiquated traditions and usages of the older countries.

The people of Australia and New Zealand are our kind of folk. They are predominantly Anglo-Saxon and they or their immediate forefathers had the vision and independence to select these far-off islands for a future home. They must have had in their make-up not only a spirit of independence, but as well of initiative, of ideals, of frugality, and of industry. This combination in any people molds the character that will peacefully conquer the world. They are the survival of the fittest of a great civilization. These people create just that impression upon the stranger visiting their shores —the survival of the fittest. The settlers of these far-off countries, after assuming the responsibility of establishing their homes there, have exercised their good judgment and insisted upon keeping their stock pure by refusing to mongrelize themselves by unwise intermixture of races. The people of these countries, because of the equable climate, live in the open; they develop physically and mentally in the out-of-doors; they are advocates of friendly contest and sports which engender the spirit of fair play; they are predominantly meat eaters, utilizing the stock of their great grazing plains. Physically and mentally the men are veritable giants; the women are strong and self-reliant, and have great charm and culture of person. These countries have a future of infinite possibilities, which will aid in balancing the peace and prosperity of civilization.